

STATEMENT OF REPEALS AND AMENDMENTS.

S. 1, PARA 1, REPEALED IN PART SO FAR AS IT AFFECTS COURTS-MARTIAL UNDER THE ARMY ACT	44 & 45 VICT, CAP 58, s. 127
SCHED. REF IN PART	Act X of 1897
Ss. 32, 41, 45, 57, 66, 91, 108, 126, 123 & 155 AMENDED	Act XVIII of 1872
Ss 15 & 55, 60, AMENDED	Act III of 1891, ss. 2, 7 & 8, RESPECTIVELY.
Ss 37 & 45 AMENDED	Act V of 1899, ss 2 & 3 (1)
NEW SECTION 125 SUBSTITUTED	Act III of 1887
NEW EXPLANATIONS SUBSTITUTED FOR EXPLANATION TO s 14	Act III of 1891, s 1 (1).
NEW ILLUSTRATION SUBSTITUTED FOR ILLUSTRATION (b) TO s 14	s 1 (2)
NEW SECTION SUBSTITUTED FOR s 54	s 6
PARAGRAPH SUBSTITUTED FOR PARA. 2, s 80	Act V of 1899, s 4
EXPLANATION ADDED TO s. 26	Act III of 1891, s 3
" " s 30	" s 4
ILLUSTRATIONS (c) & (f) ADDED TO s 43	" s 5.
PARAGRAPH ADDED TO s 73	Act V of 1899, s 3 (2)

The following changes have been made in reprinting —

- (1) The amendments made by the Acts noted in the foregoing statement have been inserted (where possible) in their proper places with explanatory foot-notes :
- (2) Some further foot-notes have been added for convenience of reference .
- (3) Section-numbers occurring in the text have been printed in figures instead of in words
- (4) The number and year of Acts referred to in the text have been noted in the inner margin, except where both appear in the text
- (5) The headings to the pages have been amplified

CALCUTTA:
GOVERNMENT OF INDIA CENTRAL PRINTING OFFICE,
8, HASTINGS STREET.

INTRODUCTORY NOTE.

IN England foreign jurisdiction and extradition are wholly distinct subjects, having no point of contact. They are dealt with by distinct sets of statutes. The subject of foreign jurisdiction has been ably treated by the late Mr W D Hall in his *Foreign Jurisdiction of the British Crown*, and the subject of extradition is dealt with by Sir Edward Clarke in his well known treatise on the *Law of Extradition*.

But in India our external relations are mainly concerned with Native States under the suzerainty of Her Majesty, enjoying varying degrees of subordinate sovereignty. Their territories are interlaced with ours, and the questions of foreign jurisdiction and extradition are closely interwoven. A reprint of the British Indian Acts relating to these questions, with the addition of explanatory notes, may perhaps be useful to those who have to administer those laws.

By way of appendix I have added (1) the Statements of Objects and Reasons to the various Bills which have now become law, (2) an important letter from the Government of India to the Colonial Secretary, Straits Settlements, setting forth the general principles which regulate extradition between British India and the Native States of India, and (3) the provisions of the Prisoners Acts, 1871 and 1894, which provide for the transfer of prisoners from jails in Native States to British territory.

M D. CHALMERS.

The 25th October, 1896

CALCUTTA :
GOVERNMENT OF INDIA CENTRAL PRINTING OFFICE,
8, HASTINGS STREET.

CADMIUM.

Cadmium is imported into India as a drug.

CÆSALPINIA, Linn.; Gen. Pl. I., 565.

A genus of Legum. in the and of the Sub-Order Cæsiæ, containing some 80 species, inhabitants of the tropical and sub-tropical regions. There are in India some 20 or 25 species.

In India this genus abounds in woody gently climbing. Leaves large, alternately imparipinnate. Flowers showy, yellow, every one as many stamens. Calyx deeply 5-lobed, with the lobes cut and in its lower, the lobes in the lower the lowest being largest and cucullate. Petals spreading, usually entire, with a distinct claw, the uppermost smaller than the others. Stamens 10, free, delicate; anthers showy, sometimes curved. Ovary sessile or subsessile, somewhat 4-angled, sometimes clothed at the tip stigma terminal. Pod oblong or ligulate, thin and flat, or thick and subtergal, indehiscent or dehiscent, smooth or in the tubercles. Germination arched above with very space.

The genus was named after Andreas Cæsalpinus, who was chief physician to Pope Clement VIII., in the latter part of the sixteenth century.

Cæsalpinia Bonducella, Fleming; Fl. Br. Ind., II., 254.

THE FEEL-A-LY; PHINC-A-LY; NICKAR.

Syn.—GILLIARDIA BONDUCELLA, Linn., G. Bonduc, W. & A.; Dale, & Gibb, Bomb. Fl., 79, in part.

Vern.—Katharany (or Katharany), also Katharanga, Kathal'ra, Katharaj, Katharajad, Kathalid, Kathalimadjar ghata, Miris, Noid, naid Katharany, naid Katharanga, Beng.; Bagas, Saktal, Bang, Kup, LEPCHA; Kath Katharany, UCHIN; Karany, Kumaun; Kithach, Katharany, AYMAR; Arbut, Hindi; Kachia, P. G., Kachli, GUJ.; Sugaragola, CATCH; Sugar ghata, Gaud, BOMB.; Sugaragola, Gajaga, Rohda, MAN.; Gajga, Gajhila, Gajaga, Dik; Gajlas, Gajagajga, Gajga balli, KAN.; Kachar-shikky, Kachli, Kachshikky, Gajhachhky, KAN.; Gachhachhky, Gajhachh, TEL.; Kachachhik Kurn, Amachhik-Kurn, MALA.; Amberakhli, Katharany, Katharany, SARA.; Kachar-illa, PERS.; Akimokli, Akimokli, Arab.; Amchurn-alla (or Amchurn-ari), SINGH.; Aulend, Kachin, UCHIN; Bora-gore, MALAY. Dr. Dymock says this plant bears the vulgar name of *Akasia India* (Dent's testicles). The specific name of the plant, as given by botanists, is derived from the Arabic name *Bunduq*, a little ball or fruit.

References.—Roxb., Fl. Ind., t. 4 C.B.C., 356; Stewart's Pb. Pl., 60, Atkinson's Hym. Dist., 730; Brandis, For. Fl., 156; Gamble, Man. Tim., 135; Pharm. Ind., 48, 44, 44; Madras Sheriff, Supp. Pharm. Ind., 60; U. C. Dutt, Mat. Med. Hind., 314; Dymock, Mat. Med. W. Ind., 2nd Ed., 248; Hall's Kew Prod., Passif. Ind. Cat., 71; Druce, U.S. Fl., 27; S. Arjun's Bomb. Drugs, 48; Spens' Encycl., 794; Gillilandina Bonduc in Balfour's Cyclop., Ed. 1865.

The Fever-nut.

CÆSALPINIA
Bonducella.

Cactus tree of the lower Himalaya (referred to by some writers) is *Euphorbia Royleana*, *Det. ind.*, vol. ch. 300.

CADABA, *Forsk.*; *Gen. Pl.*, l., 106

Cadaba farinosa, *Forsk.*; *F. Br. Ind.*, l., 173; *CAPPARIDÆÆ*

3

In *Murray's Facts and Drops of Sida* the plant has been mentioned, but its medicinal properties have not been described. It is common in Sida and in the Pat, &c.

Caden, see *Phorax pyretica*, *R. et J.*, *PALMÆÆ*.

CADMIUM.

Cadmium is imported into India as a drug.

4

CÆSALPINIA, *Linn.*; *Gen. Pl.*, l., 565

5

A genus of Leguminosae and of the Order of CAPPARIDÆÆ, consists of some 20 species, which form the tree of both India & Java. There are in India some 10 or 12 species.

The fruit erect, thick, fleshy, or woody, partly of wood. Leaves large, deeply bipinnate. Flowers of many, yellow, in racemes. Calyx drooping, with the lobes erect and in the lower, the lobes imbricated, the lower being largest and cucullate. Petals spreading, usually cucullate with a distinct claw, the uppermost smaller than the others. Stamens 10, free. Ovary 1, anthers oblong, entire, sessile. Ovary sessile or subsessile, few-seeded; style filiform, sometimes dilated at the top, a green term. nut. Seed oblong, irregularly flattened, with thick subtergal, indurated or delincent, smooth or scabrous. Germination arched above with wing of seed.

The genus was named after Andreas Cæsalpinus, who was chief physician to Pope Clement VIII., in the latter part of the sixteenth century.

Cæsalpinia Bonducella, *Fleming*; *Fl. Br. Ind.*, II., 254

6

THE FEVER-NUT; PHYSIC-NUT; NICKAR.

Syn.—*Gilantina Bonducella*, *Linn.*; *C. Bondu*, *R. & A.*, *Dale & G.*, *Forsk. Pl.*, 77, 14 part.

Vern.—*Kallarani* (or *Kallaranni*) also *Kallaranga*, *Kallistya*, *Karanfa*, *Karanjara*, *Katha ja*, *Kathuli*, *Kudjagah*, *a*, *WIND*; *Nalla*, *Nalla Kavanja*, *Nalla-Karanja*, *BENG*; *Bagan*, *SANTAL*; *Jung*, *Imp*, *LECHIA*; *Kath*, *Isranid*, *OLDIS*; *Karanu*, *KLEMAN*; *Allgeck*, *Kalaharanga*, *AMBER*; *Kishul*, *SINDI*; *Kilichid*, *pidga*, *Kathli*, *Guj*; *Sagaragola*, *CLICH*; *Sagarphala*, *gala*, *BOMB*; *Sagaragola*, *gajaga*, *raheda*, *MAH*; *Carid*, *guthala*, *gudaga*, *Dik*; *Cæsaragapalari*, *gajaga*, *balli*, *NAM*; *Kusharish*, *Illy*, *la uhi*, *Kalichid*, *gachchakkar*, *TAM*; *Gachchakkar*.

References.—*Roth Fl. Ind.*, l., 106; *Det. ind.*, vol. ch. 300; *Fl. Br. Ind.*, II., 254.

CÆSALPINIA
Bonducella.
The Fever-nut.

Habitat.—Found all over India, especially in Bengal, Burma, and South India; ascends to 2,500 feet in altitude in Kumaon.

OIL.
From seed.

7
From leaves.
 8

MEDICINE.
Seeds.
 9

Powder.
 10

in c

a cc

Ma

the leaves

Medicine.—**THE SEEDS OR NUTS**—The seeds are viewed as possessing well-marked antiperiodic properties, and are largely used by the natives instead of quinine. For this purpose they are pounded with black pepper, from 5 to 30 grains being regarded as the proper dose. Ainslie seems first to have drawn the attention of Europeans to this powder, but even up to the present date it has not apparently taken the position which it deserves as a tonic and febrifuge. It was made official in the *Indic*

has l

Take

black

stoppered bottle. Of this the dose is from 15 to 30 grains three times a day for adults. In smaller doses it is a good tonic in *Debility after Fever* and

Root-bark.
 11

In debility after fevers and other diseases "the bark of the root of

Ointment.
 12

Leaves.
 13

An ointment is made from the powdered seeds, with castor oil, and applied externally in hydrocele. Dr. Dymock says the seeds are in Bombay sold for R12 a cwt.

THE LEAVES—"In disorders of the liver the tender leaves are considered very efficacious." (Mr T. N. Mukharji's *Amst. Cat.*) Drury

The Fennel.

CASALPINIA

Bonducella.

and that in Cook's Case the leaves are employed as a digestive and emmenagogue, and that an extract of the fruit is useful in convulsions, dysentery, and colic in young children. Dr. C. R. Rose informs the author that the young leaves are used in intermitting fevers and the expelling of intestinal worms.

At the late Colonial and Indian Exhibition a plant arranged in a pot was shown by the West Indian Colonies as a native of a special cultivated form of the species. The plant is known in India, there is being all of a native origin. Nearly every French colony is used as the foliage in the preparation of a plant, but in most cases as a medicinal plant only.

Chemical Composition.—According to the chemical reports added to in the *Flora of India* (1854), Bonducella seeds, and the leaves of the root of the plant, is a greenish, greenish, and yellow.

CHEMISTRY.

14

"The seeds of the plant have not yet been analyzed chemically. It may perhaps be used in larger proportions in the food of the poor, which is said to be more so than in the use in the treatment of intermitting fevers.

"In order to examine the chemical nature of the plant, the seeds, one ounce of the leaves was powdered and extracted with dilute acetic acid. The solution, after the evaporation of the alcohol, was made alkaline with caustic potash, which did not produce a precipitate. It then was taken with the liquid completely removed in the latter manner, and yielded it in the form of an amorphous white powder, devoid of alkaline properties. It is sparingly soluble in water, but readily in alcohol forming intensely bitter solution. An aqueous solution is not precipitated by tartaric acid. It produces a greenish brown solution with concentrated sulphuric acid, which acquires subsequently a violet hue. Nitric acid is without manifest influence. From these experiments, we may infer that the active principle of the Bonducella seed is a bitter substance not producing large quantities." (J. H. and Hanb., *Pharmac. L.* pp. 212-13.)

Special Observations.—"The kernel of the seeds is decidedly tonic and antiperiodic, but much inferior in all respects to the cinchona preparations. It is useful in dysentery practice where economy is a desideratum." (*Surgeon R. D. Murrar, M.D., Burdwan*). "Nata is decidedly antiperiodic, but feeble in its action, requiring 3 to 3½ grs. of the powdered seed to check an ordinary intermitting fever." (*Surgeon R. L. Dutt,*

MEDICINE.

15

CÆSALPINIA
coriaria.

The American Sumach.

MEDICINE.

in intermittent fever and debility." (*Brigade Surgeon J. H. Thornton, D. of M. D. 1848*) "The nuts of the tree are used as a tonic in

tinued fevers, and also in asthma and general debility. Doses 3i to 3ii as an antiperiodic and antispasmodic, from 40 to 60 grains as an antipyretic, and from 10 to 30 grains as a tonic." (*Honorary Surgeon Moseen Sheriff, Khan Bahadur, Trifoliant, Madras*) "A cake made of 30 grains of the powdered kernel, the contents of one egg, and

This drug might prove very useful if its active properties were brought into a concentrated form as an extract or otherwise." (*Surgeon W. G. King, M. B., Madras Medical Dept*) "The nuts ground down and made into a paste are useful in dissolving glandular swellings, buboes, and swellings of the throat." (*Anderson, G*) "The nuts are used internal

DOMESTIC.
Necklaces.

16

Amulets.

17

Rosaries.

18

King into bracelets, neck-
"Necklaces of the seeds

strung upon cord" "The nuts are used in abortion by child the nut sorcery, shore, t

Plants, No 4, p. 48.

Dr. Ch. Rice writes to the author that "in the Malay Archipelago they are used for counters and playthings, especially in the game known as *tjongka*."

19

Cæsalpinia coriaria, Willd.

THE AMERICAN SUMACH OR DIVI DIVI.

Vern -- Libi-dibi, Bona; Amrique-La sumag, DUK.; Shimak, TAM; Sumadounam, etc.

The American Smack

CASALPINIA
canana.

C. canana is characteristic of the American Tropics.

It is a tree, native to South America and the West Indies, particularly common in New Grenada, Mexico, Venezuela, North Brazil and Jamaica. It is also found in India and some other parts of Asia. In South India, it is found in the Deccan, Malabar and Kanara in Bombay (C. canana, *Ind. Ind.*). It is a very large tree in the West Indies, where it is found in the mountains and in the lowlands.

Leaves and fruit.

The tree is a large tree, with a trunk 2 feet in diameter, and a height of 20 to 30 feet. The leaves are large, ovate, and have a serrated margin. The fruit is a large, round, green, and is eaten when ripe. The tree is a very important source of food for the people of the West Indies, and is also used for medicinal purposes. The leaves are used to treat various diseases, and the fruit is used to make a drink. The tree is also used for timber, and is a very important part of the economy of the West Indies.

TAN
Pods,
20

Powder,
21

Extracts,
22

A considerable amount of interest has, within the past few years, been taken in the subject of the introduction and extended cultivation of the Dandelion in India. The following extracts from a memorandum on this subject, published by the Government of India, Revenue and Agricultural Department, may be reproduced here—

"Dr. Wallich introduced the Dandelion plant into India about the year 1830, and it has now been thoroughly acclimated in South India, which, in wet and cold climates, it grows very well."

The Government of India, with a view to the cultivation of the Dandelion in India, has issued the following instructions:—
The Dandelion is a very hardy plant, and is able to withstand the cold weather of the winter months. It is a very important source of food for the people of the West Indies, and is also used for medicinal purposes. The leaves are used to treat various diseases, and the fruit is used to make a drink. The tree is also used for timber, and is a very important part of the economy of the West Indies.

CÆSALPINIA
coriaria.

The American Sumach.

Cawnpore Government Factory it is used as a substitute for sumach, which is a drier article.

"The actual demand for Divi-divi pods is not known. England imports about 4,000 tons every year, in addition to about 12,000 tons of sumach. But as Divi-divi is gradually ousting the latter, its demand appears to be capable of great expansion. For the same reason France, which now annually imports more than five million kilogrammes of

... in its cultivation is, that the tree requires no care after it ... trifling cost ... and for raising ... meeting the

23

CULTIVATION—The information given in the above extract might be supplemented. The plant is, however, only being experimentally tried in India as yet, and considerable difference of opinion prevails as to the best methods for its cultivation, the nature of the soil most favourable to it, and as to the means of securing a commercial success. In Mr.

Botanic Gardens the trees are ... largest plantation of Divi-divi in ... belonging to Mr. J. B. Catho of Pondicherry.

... They yield pods freely every year and the seeds are regularly distributed gratis to all applicants.

Dr. Bidie of Madras thinks the tree ...

... recommends its introduction in the salt-marshes of Australia. From the brief notice already given of ... signment of the seeds from ...

The *Cæsalpinia digyna*.**CÆSALPINIA**
digyna.

watering till they have attained the height of 3 feet, after which no more care is necessary. The plant grows luxuriantly in a clayish calcareous soil, but very slowly in red soil, as I have observed at the Red Hills near

closely packed in bags; but to be really remunerative and to show conclusive results, experimental shipments should be tried on a much larger scale than has yet been attempted, and means of continuing the supply must be available, as manufacturers will not try expensive experiments unless with some certainty of being able to get more of the substance tested, in the event of success."

Medicine.—According to Dr. Bidie, the pods are astringent. The powder prepared from them is of a light-yellow colour and astringent

MEDICINE.
Pods.
24

are made into a medicine. It makes a
om Robert Cornish, F.R.C.S.,
stringent, antiperiodic, tonic.
(Apothecary Thomas Ward,
ing leather, and makes very
as, Wallair, Visagapatam.)
I use (Bomb. Gaz., XV., Pt. I.

TIMBER.
25
26

Cæsalpinia digyna, *Rotth. ; Fl. Br. Ind., II., 256.*

Syn.—*C. OLEOSPERMA*, *Roxb., Ed. C.B.C., 356.*

Vern.—*Vakeri-māl*, *HIND*; *Umāl-kūchi*, *BENG.*; *Nunf gatcha*, *TEL.*;
Vakeri-chebbāte, *vākeri-mula*, *BOMB.*; *Sunlettā*, *BURM.*

Habitat.—A prickly tree of the Eastern Himalaya, Eastern and Western Peninsulas, and Ceylon.

Tan.—Dr. H. McGonn. in his *Notes and Treatise of the Natural History of*

TAN.
27

—(*L. Listard*)

Oil.—Roxburgh says that an oil is expressed from the seeds, which is used for lamps.

OIL.
28

Medicine.—The seeds are astringent and are used in the treatment of

MEDICINE.
29

The Sappan wood.

MEDICINE.
31

Habitat.—A scandent, armed shrub, common in Eastern Bengal

pos are used also the roasted fruits, which have a bitter taste. The finely-powdered leaves have also been administered to women immediately after delivery as a tonic to the uterus.

32 C. pulcherrima, *Sturtz.*; *Fl. Br. Ind. II*, 255. *Rexb*, *Fl Ind.*,
Ed. C B C. 356.

THE BARBADOS PRINT.

Syn.—POINCIANA PULCHERRIMA, Linn.

Vern—Arizhnochard, ИЗО, СЛЗ; Кр'наганли, КИЧ; Даунхизт;
Бичи.

Habitat.—An introduced plant, commonly occurring in nearly every garden throughout India; it forms a large elegant bush; remains in flower all the year; one variety is red and the other yellow.

Medicine.—The leaves, flowers, and seeds are largely used in native medicine." (F. Cameron, Bangalore)

Domestic Uses—It is sacred to Siva. Ink is made from the charred wood. (*J. Cameron, Bangalore*)

C. Sappan, *Linn.*; *Fl. Br. Ind.*, II, 255.

THE SAPPAN WOOD; SAMFFAN WOOD.

Vern.—Bakam, lauri, palang, Hindi, Beng; Tem, Santal; Pima

DYE.
36

This dye is said to be prepared from the roots (*tairi*), from the wood, from the bark, or from all together, and the root is reported to afford a yellow dye. The bark of *Bauhinia racemosa* is said to be used as a

roto-sulphate of iron, to
largely used in calico-

The Sappan wood.

CÆSALPINIA
Sappan.

printing, its price being about Rs 2 a cwt. Chips of the wood steeped in water yield a red colour. This is intensified by alkalis. Combined with turmeric and sulphate of iron, it gives the colour known as *Kalejas* (or liver-colour, "*lit de-rin*") With indigo it gives (*sanshi*) purple. Sappan colour, however, is not permanent, being formed through the presence of the soluble substance *Brazilin*. Tannin and alum are used as mordants.

Dye-tincture.

37

mixed with a solution of proto-sulphate of iron (*hirakoshi*). The resulting colour is a blackish grey. One seer of *tairi* and 2 chittacks of *hirakoshi* (sulphate of iron) are sufficient to dye 60 yards of cloth 1 yard wide. In the case of the wood, it is either cut into pieces or pounded and then boiled in water from 5 to 8 hours, 12 chittacks of *bakam* wood are boiled in 25 seers of water till 10 seers remain. The solution is put aside, and the same wood is again boiled in another 25 seers of water down to 10 seers. These two resulting solutions are then mixed up and allowed to cool. This is the process adopted in the Rajshahye District. To extract the dye from the bark, it is boiled down till the solution attains the necessary consistency and tint.

Mr Thomas Wardle, in his *Report on the Dyes and Tans of India*, 1887, says (page 21) that "the wood, used to a considerable extent, in this

Chip.

38

Gulal

39

(*Surgeon-Major W Dymock, Bombay*)

Medicine—Ainslie says a decoction of the wood has the property of being used as a dye, tannic and gallic, and later by the

MEDICINE.
Wood
40

"It is supposed to be used among native doctors as congealed blood (*Bomb. Gaz.*, 1871, 14). According to Dr. Irvine, it is used as an astringent in medicine (*Mat Med., Patna*, p 15). It is prescribed

by Professor of Sappan with potash, banum resin num resin"

(*Pharmacography*, 1, 61)

SPECIAL OPINIONS—§ "Has been used as an astringent tonic in atonic diarrhoea" (*Assistant Surgeon Bhugwan Das, Rawal Pindi, Panjáb*)

CAJANUS
indicus

The Pigeon Pea

TIMBER.

41

Structure of the Wood.—Sapwood white, heartwood red. The wood takes a fine polish and does not warp or crack.

Weight from 52 to 61 lbs per cubic foot.

Mr J Oameron reports that the fig insect has recently taken to this plant in Bangalore

42

Cæsalpinia sepiaria, Roxb, *Fl Br Ind*, II, 256

THE MYSORE THORN

Vern.—*Uru uri arlu*, *vela kanda aila*, Hindi; *Phuladi*, *uran* (JHE LAM) *kanda* (KAZIMIR), *dodur* (CHENAB), *selme di frian*, *dhar-hi karee*, (RAVI) *andi*, *arleh*, *daghaura* (BIAS), *onged* (SULTAN), PB; *Chillara* or *chillur* BOMB, MAR, *Hotsig*, KAN; *Sulyanba*, BURM

References.—Roxb, *Fl Ind*, Fd C B C, 357; Stewart Pb Pl 62; Brantley, *For Fl*, 156, *Kuts*, *For Fl*, *Burm*, I, 48; Gamble, *Man Timb*, 135

Habitat.—A large climbing, prickly bush on the Himalaya, and extending to Ceylon and Ava, it ascends to 4,000 feet in altitude

Gum.—"Lac is gathered on this tree in Baroda" (*Bomb Gaz.*, VII,

LAC

43

TAN

Bark

44

OIL

Pods

45

MEDICINE

46

DOMESTIC

47

39) Tan.—The bark is much used for tanning in the Konkan

Oil.—"The young pod contains an essential oil" (*Bomb Gaz.*, XV, pt I, 65)

Medicines.—In Chumba the bruised leaves are applied to burns.—(Stewart)

one nati from historic

48

CAJANUS, DC, *Gen Pl*, I, 541

one nati from historic

The generic name *Cajanus* is derived from the Malayan name for the plant (*Katjang*)

49

Cajanus indicus, Spreng, *Fl Br Ind*, II, 217

PIGEON, NO-EYE (small form) or CONGO PEA (large form),
DAL or CAJAN PEA

Syn.—*CYTISUS CAJAN*, Linn; *CAJANUS INDICUS*, Spr., *C FLAVUS*, DC.; *C BICOLOR*, DC

Vern.—

The Pigeon Pea

CAJANUS
indicus.

91, *Birdie's Mad Ram Prod, Paris Exh Cat*, 74, *Duthie and Fuller's Field and Garden Crops of the N.-W. P. and Oudh, Part II*, 20; *Atkinson's Him. Dist*, 605, *Church's Food-grains of India*, 169; *Balfour, Cyclop.*, Ed., 1885, *Smith's Dict*, 320; *Treasury of Botany*.

ago into India.

Properties and Uses—

Medicine.—The pulse is said to be easily digested and therefore suit-

MEDICINE.
50

"gums." (*Brigade Surgeon J. H. Thornton, B.A., M.B., Manghyr.*) "A poultice made with its seeds will check swellings" (*Ummegudien Native*)

FOOD.
Seed.
51

N.-W. P.
52

of a higher yield than 7 maunds. The outlay on cultivation is about the same as that for millets.

In the North-West Provinces it has been calculated that there are 35½

C. 52

Calabar Bean

CALABAR
bean

Professor Church, in his *Food Grains of India*, publishes more recent analyses than the above, from which it would appear that the amount of

..... pound
..... grains
..... uns of
..... out 1

..... these

constituents in other species of pulse from the following table—

Name	Nitrogenous matter	Starchy matter	Fatty or oily matter
<i>Cicer arctinum</i>	15.05 to 21.23	60.11 to 63.62	4.11 to 4.95
<i>Cyamopsis tetralobes</i>	29.40	52.89	1.40
<i>Dolichos biflorus</i>	23.03 to 23.47	61.02 to 61.85	6.76 to 6.87
<i>Dolichos Lablab</i>	22.43 to 24.55	60.52 to 60.81	6.81 to 7.15
<i>Vigna Catuanga</i>	24.00	59.02	1.41
<i>Ervum Lens</i>	24.57 to 26.18	59.34 to 59.76	1.00 to 1.92
<i>Glycine Soja</i>	37.74 to 41.34	29.54 to 31.68	12.31 to 18.90
<i>Lathyrus sativus</i>	31.40	54.26	0.95
<i>Phaseolus acutifolius</i>	23.40	60.78	0.64
<i>Phaseolus Mungo</i>	23.51 to 24.70	59.35 to 60.36	1.11 to 1.48
<i>Phaseolus Mungo, var. radiatus</i>	22.48	62.15	1.46
<i>Pisum sativum</i>	21.80 to 25.20	61.90 to 64.32	1.32 to 1.12

(Daden Powell, *Punjab Products*, I, 243)

..... quite equal
..... It does not,
..... at produces
..... (Punna)
..... ple who are
..... (Surgeon
K D Ghose, *Bankura*) Professor Church states that the irritant and
laxative character is greatly reduced by the grain being properly freed

FODDER
58
DOMESTIC.
59

remarks that "the stalks are used in the preparation of gun-powder in the Government works at Mazagon" (*Bombay Products*, 1862, page 17)
Employed in the Bengal gun powder works for charcoal. (*Balfour*)

Cajuput oil, see *Melaleuca Leucadendron*, Linn., MYRTACEÆ

Calabar bean, see *Physostigma venenosum*, Balf., LEGUMINOSÆ

CALAMUS
andamanicus.

The Andamanese Calamus.

CALABAR SKINS.

60 **Calabar Skins or SIBERIAN SQUIRREL SKINS.**

PETITGRIS, *Fr* ; GRANWERK, *Ger*m ; VAOR VAJO, *Il* ; Bjelka, *Rus*
GRIS FEFUENO, *Sp*

The Siberian squirrels' skins are imported into India in considerable numbers. They are of various shades, and in India are used for caps, and skin jackets, and in Europe for making muffs, tuppets, &c. See Squirrels
Also under FURS

CALAMANDER WOOD.

61 **Calamander Wood.**—A beautiful kind of rose-wood obtained from Ceylon, the timber of *Diospyros ganaita*, which see.

Calambac, see *Aquilaria Agallocha*

62 **CALAMUS**, *Linn* ; *Gen Pl*, *III*, 931

A genus of palms, generally scandent, with long, thin, trailing stems, sometimes as much as 600 feet in length. There are 200 species known, nearly all



ruminated

The generic name *Calamus* is the Latin and the Greek Κάλαμος, a reed or cane

For a more general and popular account of the genus, see under "Cane."

63 **Calamus acanthospathus**, *Griff*, *Pl ex*c, fig 1 ; *PALMÆ*

Reference.—*Gamble's Man Timb*, 423

Habitat.—Khásia Hills.

64 **C. andamanicus**, *Kurz*, *For. Fl Burm*, *II*, 519

Vern.—*Chowdah*, *AND*

References.—*Gamble, Man Timb*, 424

Habitat.—Met with in the Andamans

TIMBER.
65

Structure of the Wood.—*Dr. Kurz* describes it as "an evergreen lofty, scandent, rattan-palm, the sheathed stems being as thick as the arm and the canes up to an inch in diameter."

C. 65

The Dragon's-Blood

CALAMUS
Draco.

Calamus arborescens, Griff., Pl claxam.

CANES.
66

Vern.—*Dsnoung*, *dandón* or *sandón*, *theng*, *tyenbanyen*, *TURN*

References.—*Gamble, Man Timb*, 423. *Austr. For. Fl. Burm.*, 11, 516

Habitat.—An erect, elegant cane, often stoloniferous, met with in Pegu.

C. collinus, Griff., *Pl. elxari*; Garbale, *Mon. Trib.*, 423

67

Habitat.—An erect cane, met with in the Khasia Hills and in Upper Assam.

C. (Dæmonorhops, Mart) Draco, Willd , Blume in Rumphia, II.,
t. 131-32.

68

THE DRAGON'S BLOOD, CALANIS

Vern.—Apsang, pengkasa', damaiwari, damai-ahkain, jolia rami, hiradukhi, HIND, Hira dahan, hiradukhi, BOMR, MAR, GUJ, CATCH, Kolangarung, MALA, Kento-mungarattam, TAM., Damai-ahkain Qhax of the Isthmus damai-ahkain Damai-ahkain

his step-mother.

References.—*Proc. Roy. Soc. Edin.*, 1883, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 8

rock says: "The
9 annas to Ri
py forests near
and in Penang,
ies chiefly from

Borneo. There are, however, two distinct forms of Dragon's-blood—the modern and the ancient.

Properties and Uses—

Gum.—This gum is sold in dark-red friable masses, from which a blood-red powder is obtained; this is often met with in the bazar packed in the interior of canes.

GUM,
60

The fruits of *C. Draco* are clustered, each covered with beautiful imbricating scales, which are coated with a red resinous substance. The fruits are collected, placed in long bags, and violently shaken; the resinous

appears to be the refuse of this last process. It is perhaps doubtful whether this article is procured from the plant by incisions "

Other species of *Calamus* also yield Dragon's-blood, and from incisions on the stem a resinous substance resembling Dragon's-blood is obtained from *Draena Draco*, a tree of the *LILIACEÆ* and a native of the Canary Islands. A famous specimen of this tree, one often referred to by writers

CALAMUS
Draco.
The Dragon's-Blood.

CANES.

Varnish
70MEDICINE.
71

on paper, or has an earthy look on fracture.

Medicine — **DRAGON'S-BLOOD** — In the first mention we have of this drug it is spoken of as exported to the East from Arabia and Socotra.

the **DRACO** in the tenth century.

chiefly used as a colorant for paper and ink.

SPECIAL

Dragon's blood

Major W. Dyn...

"The Burmese *Kyeng-ut* produces a red exudation like Dragon's blood. Dr. Mason presumes this to be **C. Draco**." (*J. C. Hardinge, Rangoon*)

§ "Astringent, used as a dressing for ulcers." (*Surgeon W. Barren, Bhuj, Cutch*)

72

Draco of *C. Draco* ... the presence of acetone, **Toluol**, $C_6H_5(CH_3)$, H_2 (*Draconyl*), has

tence in the drug of
e hydrocarbons are

... portion yielded by
the presence of benzoic alcohol, $C_6H_5(CH_2OH)$.

C. 72

The Rattan

CALAMUS
fasciculatus.

CANES

* As benzoic acid is freely soluble ——— removed from the drug by that solvent got traces of an amorphous red matter nothing crystalline. Cinnamic acid, on according to Hirschsohn (1877) As to blue colour on addition of perchloride of contain phenol or pyrogallol rather than pyrocatechin

"By boiling Dragon's blood with nitric acid, benzoic, nitro-benzoic, and oxalic acids are chiefly obtained, and only very little picnic acid Hlaszwetz and Barth melted the drug with caustic potash, and found among the products the same formed with technique and colour yields same

The more —

.. .

error of supposing the presence of benzoic acid arose through confounding it with cinnamic acid or possibly from working with a resin in which benzoic acid had been formed by partial oxidation They established the chemical characters of four kinds of dragon's blood, the origins of two of which were authentic, namely—

Dragon's blood from *Calamus Draco*.—Is of a brick red colour, melts at 80°C , giving off highly irritating fumes, is insoluble or nearly so in cold caustic soda ammonia, lime water, and sodium carbonate, but dissolves when boiled in these reagents It may be represented by the formula $\text{C}_{18}\text{H}_{18}\text{O}_4$

Dragon's blood from *Dracena Cinnabari*.—Is vermilion-coloured, melts at 80°C , giving off aromatic irritating fumes, is readily soluble in cold caustic soda, ammonia, lime-water, and sodium carbonate It may be represented by the formula $\text{C}_{18}\text{H}_{18}\text{O}_4$ (*Pharm Journ*, 1883) This is probably the true *dam ul akhwan* of the Arabs, it occurs in tears covered with a dull red powder

Calamus erectus, Roxb, *Fl Ind*, *Ed C B C*, 719

73

Vern.—

Hal

Foc

cane as a

FOOD.

74

C. extensus, Roxb, *Fl Ind*, *Ed C B C* 720

75

Vern.—Dengullar SYLHET, Nalapola TEL

References—Gamble, *Man Timb* 424; *Drury's U P of India* 96

Habitat.—Met with in Sylhet, and said to often attain a length of 600 feet. Extensively used in the northern Cachar and Manipur Hills for suspension bridges

Food—Seed eaten as a substitute for betel nuts

FOOD.

76

C. fasciculatus, Roxb, *Fl Ind*, *Ed C B C*, 721

77

Vern.—Bara bet BENG, Perambu, MALA TAM, Amla vetasommu,

TEL Dutt gives *Ambutetasa*? (=a rattan growing in water) SANS but Dr Ch Rice informs the author that this determination is incorrect

CALAMUS
hypoleucus.

The Rattan.

CANES

and that the Sanskrit name of this species is more likely to be *Vetras*;

Brandis, *For Fl*, 559, *Gamble*,
Burm, 517, *Balfour*, *Cyclop*.

Habitat—Met with on the plains and hills of Bengal, Orissa, Chutta

DOMESTIC
78

gushed from all the other species of *Calamus* by the direction of its clustered pinnules (resembling *Zalacca*) with spinous margins and keels. The male spikes are also shorter and broader than those of other species.

79 *Calamus flagellum*, *Griff*, *Gamble*, *Man Timb*, 423

Vern.—*Rabul*, *bet*, *NEPAL*; *Reem*, *LEPCHA*; *Nagagola bet*, *Ass*

Habitat.—Met with in Sikkim and Assam

80 *C. floribundus*, *Griff*, *Pl exalt*, *Gamble*, *Man Timb*, 423

Habitat.—Met with in Upper Assam

81 *C. gracilis*, *Roxb*, *Fl*, *Ed C.B.C.*, 721.

Vern.—*Mapuri bet*, *BENG*, *Krasang*, *MACH*; *Hundi bet*, *Ass*.

References.—*Griffith*, *Pl exalt*, *Gamble*, *Man Timb*, 423, *Drury*
Useful Plants of India, 97, *Kurz*, *For Fl*, *Burm*, 520; *Thunberg*, *En*,
Ceylon Fl, 330, *Balfour*, *Cyclop*

Habitat.—Met with in Assam, Chittagong, and South Ceylon

82 *C. grandis*, *Griff*, *Pl exalt*, *Gamble*, *Man Timb*, 424, *Kurz*,
II, 523

Syn.—*Dæmonorops grandis*, *Kurz* (*Enum*, 30)

Vern.—*Rotang sumambo rotang chry*, *MALACCA*

Habitat.—Met with in Malacca and the Andaman Islands, stem about
 2 inches in diameter

83 *C. Guruba*, *Mart*

Vern.—*Kyeing nee kyeinn*, *BURM*

References.—*Gamble*, *Man Timb*, 424; *Kurz*, *For Fl*, *Burm*, 522

Habitat.—Met with in Chittagong and Burma

84 *C. Hefserianus*, *Kurz*, *II*, 521 (*Enum*, 39), *Gamble*, 424

Habitat.—Met with in Tenasserim or the Andamans

85 *C. humilis*, *Roxb*, *Fl Ind*, *Ed C.B.C.*, 719

Reference.—*Gamble*, *Man Timb*, 423

Habitat.—An erect cane of Chittagong

86 *C. hypoleucus*, *Kurz*, *For Fl*, *Burm*, *II*, 523

Syn.—*Dæmonorops hypoleucus*, *Kurz* (*Enum*, 29)

Reference.—*Gamble*, *Man Timb*, 424

Habitat.—Met with in Tenasserim

C 86

The Rattan.		CALAMUS Mastersianus
Calamus inermis, T And , Gamble, Man Timb , 424	Vern.—Dangri bet, NEPAL , Brool, LEPCHA Habitat.—Frequent in Sikkim and Bhutan Furnishes the finest alpen stocks	CANES. 87
C. Jenkinsianus, Griff, Pl. clxxvi A , fig 3, Gamble, Man Timb 424, & xxx	Syn.—CYMBOSPATHES JENKINSIANUS, Gamble Vern.—Gola bet, Ass , Gallah, CACHAR Habitat.—Met with in the Sikkim Terai, the Duars and Assam	88
C. latifolius, Roxb., Fl Ind, Ed C B C , 719	Vern.—Araak bet CHITTAGONG; Sain, MAGH , Ya ma ta, BURM References.—Griffith Palms Br Ind., 63, Pl exxxii , Brandis For Fl, 550, Gamble, Man Timb , 423 424, Kurz, For Fl, Burm, 518	89
	tim the thick as a walking-cane.	90
C. leptospadix, Griff, Pl lxxv A ; Gamble, Man Timb , 423	Vern.—Dangri bet, NEPAL , Lat, LEPCHA Habitat.—Found in Sikkim and the Khasia Hills	91
C. longipes, Griff, cciii A & B ; Gamble, Ma . Timb , 424	Vern.—Gola bet SUNDERBUNDS Habitat.—Dr King has identified this plant, proving the existence in India of a species hitherto supposed to be confined to Malacca	92
C. longisetus, Griff, Palms, Br Ind , 44, Pl clxxxix A , Thwaites, En Ceylon, Pl 330	Habitat.—An erect palm, very much resembling C. arborescens ; met with in Pegu and Ceylon	93
C. macracanthus, T And , Gamble, Man Timb , 424	Vern.—Phekori bet, NEPAL , Ruebee green, LEPCHA	94
C. macrocarpus, Griff, Pl clxxx VI A , figs 1 & 2, Gamble Man Timb., 423	Syn.—C ERECTUS Roxb Habitat.—An erect cane met with in the Bhutan Duars	95
C. Mastersianus, Griff, Pl ccvi , Gamble, Man Timb , 424	Syn.—C GURUBA Kurz Vern.—Sui di-bet quabi bet, Ass Habitat.—Met with in Assam, and, according to Griffith, is the smallest cane in Assam, being less than half an inch in diameter	96

The Rattan.	CALAMUS tenuis.
<p>Fibre.—This is the species which yields the best and stoutest rattan canes of commerce. Other species are, however, used as substitutes. It is split into strips and platted or woven into baskets, chairs, sofas, and carriages. It is made into ropes, or is stretched entire across rivers, as the main supports of cane suspension-bridges. For further information see CANES.</p>	<p>CANES FIBRE. 105</p>
	<p>FOOD. 106</p>
<p><i>Calamus Roxburghii</i>, Griff., <i>Palms</i>, Br. Ind., 55, Pl. cxii</p>	107
<p>Syn.—C. ROTANG, Roxb. (non Linn), Fl. Ind., 720, Thwaites, En Ceylon Pl., 330.</p>	
<p>See C. Rotang, Linn, above.</p>	
<p><i>C. Royleanus</i>, Griff., Pl. cacti</p>	108
<p>Syn.—C. ROTANG, Linn, in part</p>	
<p>References.—Brandis, For. Fl., 559; Gamble, Man. Timb., 423, Drury, Us Pl., 67.</p>	
<p>Habitat.—Met with in Dehra Dun and in Northern Bengal</p>	
<p><i>C. rudentum</i>, Lour.</p>	109
<p>Vern.—Mā-wāi-wel, SINGH</p>	
<p>References.—Roxb., Fl. Ind., Ed. C.B.C., 719</p>	
<p>Habitat.—A native of the Malacca and of Ceylon</p>	
<p>Fibre.—D</p>	<p>FIBRE, 110</p>
<p>Ceylon for ropes, chairs, baskets, streams and rivulets used by the people of and for plating beds, for bridges across</p>	
<p><i>C. schizospathus</i>, Griff.; Gamble, Man. Timb., 423.</p>	111
<p>Vern.—Rong, LEPCHA.</p>	
<p>Habitat.—An erect cane, native of Sikkim and the Khasia Hills</p>	
<p>Structure of the Wood.—Stem about 2 inches in diameter, with hard wood and closely packed fibro vascular bundles</p>	<p>TIMBER. 112</p>
<p><i>C. Scipionum</i>, Lour.; Brandis, For. Fl., 560</p>	113
<p>THE MALACCA CANE (See also under CANES)</p>	
<p>Habitat.—A native of Sumatra and Cochin China</p>	
<p>The canes are largely imported into India, after having been smoked, a process which gives them their beautiful brown colour.</p>	
<p><i>Calamus</i>, sweet, see <i>Andropogon Schoenanthus</i>, A. 1117.</p>	
<p><i>C. tenuis</i>, Roxb., Fl. Ind., Ed. C.B.C., 721</p>	114
<p>Syn.—C. MONOCUS, Roxb., Fl. Ind., Ed. C.B.C., 722</p>	
<p>Vern.—Bandhari bet, CHITTAGONG, Kring, MAGN, Yalla bet, ASS, Yali, CACHAR</p>	
<p>References.—Griffith, Pl. ceylon A, B, & C, Brandis, For. Fl., 559, Gamble, Man. Timb., 423, & xxx, Kuhn, For. Fl., Burm., 520, Thwaites, En Ceylon Pl., 330</p>	
<p>Habitat.—A monocious climbing cane, met with in Assam, Sylhet, Chittagong, Pegu, and in the hotter parts of Ceylon</p>	
C. 114	

CALF-SKINS.

Calf skins.

115

Calamus tigrinus, Kurz, For. Fl. Burm., 519

Vern.—*Leme, Burma, Amdah, 440*
Reference—*Gamble, Man Timb., 414*

Habitat.—Found in Burma and the Andamans

The Vernacular names given to Canes sent to the Paris Exhibition, the scientific names of which have not been determined.

Persons who have the opportunity of doing so may find it possible to ig with leaves and fruits so as

jayat and golak, the first is

soondi, and gallah, from Burma

CALAVANCE.

116

Calavance.—Colonel Yule tells us that this name was once in common use in English, and may, perhaps, to this day be used at sea for a kind of bean, perhaps the Indian *Vigna Catuag*, or a species of *Phaseolus*. The word comes from the Spanish *garbanzos*, which DeCandolle says is the Castilian name for *Cicer arvense* (gram). See DeCandolle's *Ori-gin Cult. Plants*, p. 323.

Calcium, see under Lime; also Marble and Limestone.

CALENDULA, Linn., Gen. Pl., II., 454

117

Calendula officinalis, Linn., Fl. Br. Ind., III., 357; Bot. Mag., t. 3204; COMPOSITÆ

MARIGOLD

Vern.—*Aklel ul mulk, aergul, seldhargh, Pa., Hlat la ya, Burma*

"*Aklel ul-mulk* is *Astragalus hamosus*, a leguminous plant" (Assistant Surgeon Sakharum Arjun Ravi, L.M., Gurgaum, Bombay)

References.—Stewart, *Panjab Plants*, 123, Balfour, *Cyclop*

Habitat.—Found in the fields of the Panjab and Sind, scarcely indi-genous, Peshawar (*Antichison*). Stewart says it is called

DYE
118

but more correctly be attributed to the *genda*, *Tagetes patula*. Both plants are used as dyes and are often mistaken the one for the other

OIL.
YIQ
FODDER,
120

an oil.
by cows,

Calf-skins, see HIDES AND SKINS

Calicos or Calicut Cotton Goods.

CALICO.

CALICO.

121

Calico. Cotton cloth originally made at Calicut.

Vern.—*Kapra*, HIND; *Tuni*, TAM.; *Gudha*, TEL.; *Kapin-kapas*, MALAY.

The earlier writers speak of the cotton fabrics of India as "linens." When introduced to modern Europe they received the name of Calicos, after the town of Calicut on the Malabar Coast near Cape Comorin.

ties of England, it may be doubted how far the unprecedented success which rapidly ensued could have occurred. The time-honoured handlooms of India had then to give place to competition with the delicate and beautiful year by year, was made hence of the Indian weaver side of the world migrated

wave by wave
piece goods an
Indian market
goods and yarn
But indications

is feared over-competition has in Europe given birth in many cases to a depreciated article, and not in India only has the outcry gone forth against the

ting not in the yarn trade only, but in the piece goods as well, and last

article produced at the very door of the factory. Economy of time and a saving of two freights may yet work the same revolution in the cotton trade of India as has become an established principle in jute.

For further information see Cotton and Gossypium.

CALICOPTERIS.

Calicopteris floribunda, Lam.; COMBRETACEÆ.

Syn.—*GEYONIA FLORIBUNDA*, Roxb., *Fl Ind*, 11, 428Vern.—*Kekorany*, C P., *Bandi*, *murududu*, TEL.; *Marsada*, *bolu*, MYSORE.

122

CALLICARPA
lanata.

The Callicarpa.

A large climbing shrub of Central and Southern India
Wood yellowish white, moderately hard, with numerous broad medul-
lary patches of soft pith-like texture

Calisaya Bark, see *Cinchona Calisaya*; RUBIACEÆ

CALLICARPA, Linn ; Gen Pl., II., 1150.

123

Callicarpa arborea, Roxb, Fl. Br Ind, IV, 567; VERBACEÆ.

Vern.—*Ghivala, dera, shivali, Kumaon, Ghivala, Cutch; Bormala,*

R

Habitat.—A moderate sized tree with brownish, rough, grey bark, met
with in Kumaon, Oudh, Eastern Bengal, and Burma; chiefly in second-
growth forests

MEDICINE.

124

Medicine.—The bark is aromatic and bitter, and is applied in decoction
to cutaneous diseases

§ "Tonic, carminative" (*Surgeon W. Barron, Bhuj, Cutch*)

TIMBER.

125

Structure of the Wood.—Grey, moderately hard, even-grained. Annual
rings visible. Polishes beautifully, but is not used except for charcoal

126

C. cana, Linn, Fl Br Ind, IV., 568.

Vern.—*Arusha, CHITTAGONG*

References.—*Roxb, Fl Ind, Ed C B C, 131, Royle, Fib. Pl, 310; Balfour, Cyclop*

Habitat.—A shrub of Bengal, common in forests and along road-sides
in the Terai and Duars, extending probably southwards to the Ganges

FIBRE.

127

Fibre.—Royle, in his *Fibrous Plants of India*, says that a fibre is

obtained from the bark, which is easily worked, with little or no waste, &c." (*Royle, page 311*)

TIMBER.

128

Structure of the Wood.—White, soft. Annual rings marked by a line
of closer pores

C. incana, Roxb, Syn for *C. macrophylla*, Vahl, which see

129

C. lanata, Linn, Fl Br Ind, IV, 567

(*C. cana*), p 716, *Balfour, Cyclop, Ed 1885*

Habitat.—A shrub of Western and Southern India and the Circars.

MEDICINE

130

Medicine.—Ainslie says that this plant is reckoned by the Javanese
amongst their emollients. The bark, according to that author, possesses a

C. 130

ALLICARPA
lanata

The Callicarpa

A large climbing shrub of Central and Southern India
Wood yellowish white moderately hard, with numerous broad medul-
lary patches of soft pith like texture

Calisaya Bark, see *Cinchona Calisaya*; RUBIACEÆ

CALLICARPA, Linn ; Gen Pl, II., 1150

123 *Callicarpa arborea*, Roxb, Fl Br Ind, IV, 567; VERBENACEÆ.

Vern.—*Ghimala dera shizal*, KUMAON *Ghimala* Cutch; *Bormala*,
BENG *Bundun* KOL; *Dumkotokot* SANTAL; *Bogodi, gogdi* KHAR

R .

Habitat —A moderate sized tree with brownish, rough, grey bark, met
with in Kumaon, Oudh, Eastern Bengal, and Burma, chiefly in second-
growth forests

Medicine —The bark is aromatic and bitter, and is applied in decoc-
tion to cutaneous diseases

§ 'Tonic, carminative' (Surgeon W Barron Bhuj, Cutch)

Structure of the Wood —Grey, moderately hard, even-grained An-
nual rings visible Polishes beautifully, but is not used except for charcoal

MEDICINE
124

TIMBER
125

126 *C. cana*, Linn, Fl Br Ind, IV, 568

Vern —*Arusha* CHITTAGONG

References —Roxb, Fl Ind, Ed C B C, 131 Royle, Fib Pl, 310;
Balfour Cyclop

Habitat —A climbing shrub

in the

Fib

prepar

son re

or corc

and ev

(Royle, page 311)

Structure of the Wood —White, soft Annual rings marked by a line
of closer pores

FIBRE
127

TIMBER.
128

C. incana, Roxb, Syn for *C. macrophylla*, Vahl, which see

129 *C. lanata*, Linn, Fl Br Ind, IV, 567

t, Ic, t 1736,

Coat comul,

or Fl, 368

Flon Pl, 243,

ispens 456

ADA, Dals &

Mat Med, W Ind

Gibbs Bomb Fl 200 non Linn, Dymock
(C cana), p 716 Balfour Cyclop, Ed 1885

Habitat —

Medicine -

amongst their

MEDICINE
130

C. 130

sc
a

The Calligonum

CALLIGONUM
polygonoides.

peculiar sub-aromatic and slightly bitterish taste, and may probably be found to have other medicinal virtues. The Malays consider the plant as a diuretic. Drury mentions that in Upper Hindustan the root is employed in cutaneous affections. Dr Trimen writes to the author that in Ceylon "the leaves, roots, and bark are used locally by the natives for

aromatic and slightly bitter to taste, betel leaves" (Drury)

FOOD.
131

Callicarpa longifolia, Lamk., *Fl Br Ind*, IV, 570

132

References.—Roxb *Fl Ind*, Ed C B C 132; Brandis, *For Fl*, 369, *Aura For Fl Burm II* 375. C. CANA, Wall Cat

Habitat.—A shrub of the Malaya Peninsula, Penang, and Nicobar Islands, and var lanceolata of Eastern Bengal, Khásia hills, Chittagong, and Burma

C. macrophylla, Vahl, *Fl Br Ind IV.*, 568

133

Syn.—C. INCANA Roxb. C. ROXBURGHII, Wall, C. CANA, Gamble's *Day List and Man Timbers*, but non Linn

Vern.—Pattharman ba pattra, bawna, JHELAN, Sámáli, CHENAB, Den thar druss, RAVI, Daya, shiwali, KUMAON, Maikara mattranya BENG

References.—Roxb *Fl Ind Ed*, C B C, 132; Brandis, *For Fl*, 368, *Aura For Fl*, Burm., 374, Gamble, *Man Timb* 282, also 283, Stewart *Pb Pl*, 165, Baden Powell, *Pb Pr*, 571, Balfour, *Cyclop*

Habitat.—A tall shrub of Northern and Eastern India, found as far north as Hazara, and ascending the Himalaya to 6000 feet, and abundant in Bengal

The Flora of

Medicine—

joints (whence the name ba-pattra, from ba, rheumatism) (Surgeon Major W D Stewart, Cuttack)

MEDICINE.
134

C. rubella, Lindl., *Fl Br Ind*, IV, 569

135

Vern.—Sugramuk LEPCHA

Habitat.—A small tree of the North East Himalaya to the hills of Martaban

C. vestita, Wall *Fl Br Ind*, IV, 567

136

Syn.—C. LANATA, Gamble's *Man Timbers*, and *Darjeeling List*, non Linn

CALLIGONUM, Linn, *Gen Pl*, III, 95

Calligonum polygonoides, *Fl Br Ind*, V 22, POLYGONACEÆ

137

Habitat.—A slow growing shrub of the arid zone of Sind, the Panjab, and Rajputana, distributed into Afghanistan and Western Asia

CALLITRIS
quadrivalvis.

The Sandarach.

MEDICINE

I38

FOOD.

I39

FODDER

I40

TIMBER.

I41

has a pleasing appearance; its leafless branches and small pink flowers being in May succeeded by the small fruit

Medicine—The roots are bruised, and, boiled in combination with *Catechu* (*Kath*), are used as a gargle for sore gums. (*Murray*.)

Food—The flowers, when fallen, are gathered and eaten as food by the natives. The abortive flowers are either made into bread or are cooked with ghee or coconut oil

Heartwood

The branches

CALLITRIS, *Vent*; *Gen Pl*, III, 424

I42

Callitris quadrivalvis, *Vent*; *DC Prod*, XVI, 2, 452; *CONIFERÆ*.

THE SANDARACH OF ARAB (See Sandarach.)

Syn.—*THUJA ARTICULATA*, Vahl

Vern.—*Sandaras*, *sandarach* (resin), *SIND*, *Chandrasa*, *Mar*, *Sundaras*, *Guj*, *Sandaras*, *PERS*

References—*Brandis*, *For Fl*, 535, *Gamble*, *Man Tsm*, 394, *U. S Dispens*, 1744, *Flückiger*, *Pharmakognosie* (Berlin, 1883), p. 94, *Murray*, *Drugs & Pl Sind* 27, *S Arjun*, *Domb Drugs*, 133, *Spens*, *Encyclop*, 1681, 1684, 3012, *Balfour*, *Cyclop*, Ed 188; *Smith*, *Economic Dict*, 317, *Kew Cat*, 130

Habitat.—A large tree of the forests of Algeria, might be introduced into India

RESIN.

I43

Resin—"The resin exudes naturally from the bark of the stem, but the common practice is to make incisions in the stem, particularly near

... it is used for preparing the surface of parchment and paper
... drug market is
... piece of paper
... may be written

was shown at

It consisted

MEDICINE

I44

... nigratory after
... (Murray) It was formerly given internally and used in the
preparation of various ointments and plasters (*U S Dispens*)

SPECIAL OPINIONS—§ "Advantageously used in hæmoptysis, male-
na, and chronic diarrhoea, as an astringent" (*Surgeon E W. Saringe*, *Ra-
jabundry*, *Godavari District*) "It makes a good varnish which is
rich to
oil (lin-

TIMBER

I45

of the

C. 145

... 145 4 inch brown

CALOPHYLLUM
inophyllum.
The Alexandrian Laurel.

Populus balsamifera, *Calophyllum inophyllum*, and *Calophyllum Calaba.* These are ger- true *Tacamahaca* from Curacao and *Tacamahaca orientale.* The *United States* of resin under the name *Tacama* sed to afford one of these. *Birdwe* Products, remarks that

it is stated that a resin exudes from the roots of this plant, and that this is the *Tacamahaca* of the Isle of Bourbon. He also quotes Lindley, who affirms that the true East Indian *Tacamahaca* is produced by *Calophyllum Calaba* and that

But in his *Report on Gums and Resins*, after reviewing the opinions on the subject of the supposed Indian source of this gum, says: "There is no evidence substantiating a

connection."

It is never that no has been found it

it is never that no has been found it

it is never that no has been found it

it is never that no has been found it

it is never that no has been found it

it is never that no has been found it

it is never that no has been found it

it is never that no has been found it

it is never that no has been found it

it is never that no has been found it

it is never that no has been found it

gum
148

oil
149

CALOPHYLLUM
tomentosum

The Poon Spar

TIMBER.
153

Structure of the Wood.—Similar to that of *C. spectabile* Mr Ches-
ter of the Forest Department says it is used largely in Chittagong for
masts, spars, and rafters, and sometimes in small boat-building and canoes
Weight from 38 to 40 lbs a cubic foot.

154

Calophyllum spectabile, Willd, *Fl Br Ind*, I, 271, Wight, *lc*,
I 128 & III

Syn.—*C. MOONII*, Wight, *C. ANGENUM*, Hall; *C. TETRAPETALLUM*, Roxb
Vern.—*Panta-ka* Iyandso, BURM, *Dakar Isalada*, AND; said to be known
as *Lal chum* in Hind

References.—Roxb, *Fl Ind*, Ed C.B.C., 438; Kuhn, *Fer Fl Burm*, I,
94, Gamble, *Man Timb*, 15, Thwaites, *En Ceylon Pl*, 51; Bedd, *Fl*
Syl, XVII

Habitat.—A tall evergreen tree of Tenasserim and the Andaman
Islands

TIMBER.
155

Structure of the Wood.—Light red, shining, cross-grained moderately
hard Is used for masts and spars, also for planking, for which purpose
it has lately been employed in building barracks in the Andamans

156

C. tomentosum, Wight, *lc*, I 110, *Fl Br Ind*, I, 274

THE POON SPAR, SIRPOON TREE

Syn.—*C. ELATUM*, Beddome, XXII & I 2

Vern.—*Pan sirpon* BOM, *Pan*, *pane*, *pane* MALA *Pong*, TAM

R

Habitat.—A large, tall, evergreen tree, often growing to a height of 150
feet, met with in the evergreen forests of the western coast from Kanara
southward, and in Ceylon, ascending to altitude 5,000 feet.

Property and Uses—

GUM
157

Gum.—Dr Dymock informs the writer that this tree yields a black
opaque gum, which, in the bazar, occurs much mixed with pieces of bark;
it is feebly astringent, and very soluble in cold water The solution is
brownish yellow, exhibiting a strong blue fluorescence.

"If this gum is steeped in water for some time, the solution becomes
very dark in colour Alum, followed by carbonate of soda, throws down
apparently some of the brown colouring matter without interfering with
the fluorescence, since after precipitation the solution, although lighter in
colour, is very strongly fluorescent A solution purified by alum in this
way has its fluorescence immediately destroyed by acids and restored
again by alkalis Examining its absorption spectrum it is found that
while fluorescent the solution gives a broad absorption band at the violet
end of the spectrum extending to about G, this band disappears on
destroying the fluorescence by acids but reappears on the addition of
alkalis The solution of the gum does not appear to rotate polarised light
The gum itself communicates only a very faint fluorescence to rectified
spirit (Lyon) I am not aware of either of these gums having been
applied to any industrial or medicinal uses but as they are collected by
the natives, it is probable that they are supposed by them to have some
medicinal virtues" (Dymock, *Mat Med*, W Ind, 2nd Ed, 87 88)

Oil.—The seeds in Ceylon yield an abundance of oil known as *Keena-
tel* it is probably used as a lamp-oil

Structure of the Wood.—Same as that of *C. spectabile* This tree
affords the Poon Spars of commerce, these are much used for masts, and

OIL
158
TIMBER.
159

C. 159

The Swallow-words

CALOTROPIS

often fetch large prices The timber is also used for building and bridge-work

A single tree has been known to realize more than £100 (Rs. 1,000) "
(Bomb Gaz., XV, 64)

Calophyllum Walkeri, *Wight, Ic., t. 45, Fl Br, Ind, I, 275*

Syn.—*C. DECIPiens*, *Wight Ill., v. 128*

References—*Thwaites, En Ceylon Pl, 51, Cooke, Oils and Oil seeds, 32; Balfour, Cyclop*

Habitat.—A large tree, found in South India and Ceylon

Oil—The seeds yield an oil, used for burning.

160

OIL.
161

162

C. Wightianum, *Wall, Fl Br Ind, I, 274, Biddome, Flora Sylat, t. 90, Wights Ill I, 128, also Ic, t. 106*

Syn.—*C. SPURILUM* *Chens and of Drury, Us Pl, C DECIPiens*, *Wight, Ic, t. 106 (not of Thwaites)*

Vern.—*Kalpan, Kull ponné, bobbi, KAN, Chera pinnay, palengi, TAM, Tiarou-fanna MALA, Cherupinnay (as in Lisboa), Sarapuna (as in Dy-*

Habitat.—An evergreen tree of the Western Ghats, from the Konkan to Travancore

Gum.—"The gum occurs in large, translucent, irregular lumps of a

GUM
163OIL
164MEDICINE
165

Food—The fruit, when ripe, is red and sweet It is eaten by the natives (*Drury*)

Structure of the Wood—Hard, red Biddome and also Lisboa say the timber is in Kánara much esteemed, and is valuable for engineering purposes

FOOD.
166TIMBER.
167

Calosanthès indica, *Blume*, see *Oroxylon indicum*, *Vent*, BIGNONIACEÆ

CALOTROPIS, *R Br, Gen Pl, II, 754*

168

THE SWALLOW-WORDS

A genus of ASCLEPIADEÆ containing only three species, these are inhabitants of tropical Asia and Africa

Erect shrubs glabrous but with a hoary powder Leaves opposite broad, subsessile Flowers medium-sized in umbelliform or sub-racemose cymes Corolla valvate, broadly campanulate, coronal scales 5 fleshy laterally com

CALOTROPIS
gigantea.

The Swallow worts

pressed, radiating from the large staminal column dorsally spurred *Stamens* 5, adhering around the staminal axis, anther-cells with a solitary pollen mass in each, pendulous flattened, tips of the anthers membranous, inflexed *Follicles* paired, thick, short, seeds comose

169

Calotropis Acia, Ham ; ASCLEPIADEÆ

Syn —ASCLEPIAS HERBACEA, Roxb, *Fl Ind*, Ed C B C, 259

Habitat.—A form met with in Eastern Bengal and Sikkim, having petiolate leaves, the blade tapering into the petiole and with a globular corolla tube

This is much less known than either of the following species, and no particulars of its properties and uses are available.

170

C. gigantea, R Br, Fl Br Ind, IV, 17, Wight, Ill, t 155, 156 A.

Syn —ASCLEPIAS GIGANTEA, Willd

Vern.—*Madar*, sk, ag, urk, okond, akan, mudhar, safed-uk, HIND, *Akanda gurdkand, swet-akond*, BENG, *Akavua*, SANTAL, *Auk*, NEPAL, *Akra*, rui, *akanda manlará* BOMB, *Akanda*, rui, *akda cha khada*, MAR, *Akado*, *akdamu khada dhola akdo*, GUJ, *Bir-elosha* SIND, *Vee*

—*kurh, jingui, itaduri, java*

References —Roxb, *Fl Ind*, Ed C B C, 251 *Wight Contr Botany, India* 53 *Brandis, For Fl*, 331; *Kurz, For Fl, Burm II* 200 *Cambd* 11

Atkinson Him Dist 788, 794 *McCann, Dyes and Tans of Bengal*, 56, *Birdwood, Bomb Prod* 52, 209, 259, 269, *Lisboa, Us Fl of Bomb*, 211, 232, 260, 279, 282, 290, 291, *Kew Reports* 1877, p 37, *Kew Official Guide to the Museums*, p 67, *Spons, Encyclop*, 818, 933, 1627, *Balfour, Cyclop*, Ed 1885, *Smith, Dic*, 278, *Treasury of Botany*

Habitat —An erect, spreading, perennial shrub, chiefly frequenting waste lands. It ascends to 3,000 feet on the Himalaya and extends from the Panjab to South India.

distributed to the in Burma, and cera, it is distrib

History —*Vedic literature* which were used the plant, name corruption, the (*Fluck & Hanb*

Madár Gutta percha.

CALOTROPIS
gigantea.GUTTA-
PERCHA.

Mir Muhammad Husain notices three kinds,—1st, a large form with white flowers, large leaves, and much milky juice, found near towns, 2nd, a form with smaller leaves and flowers, white on the outside but lilac within, and 3rd, a still smaller kind with pale greenish-yellow flowers (*Dj mock*). The 1st and 2nd are most probably forms of *C. gigantea*, and the 3rd, *C. procera*.

or probably three species. *C. procera* was first described from a specimen collected in Egypt by Prosper Alpinus (1530-84), and figured by him on his return to Italy (*De Plantis Aegypti*, 1592). It is also the *Apocynum synicum* figured by Clusius (*Flück & Haub, Pharmacog*).

The drug prepared from one or other of these species was apparently well known to the Arabians. Ibn Baytar (*Sontleimer's translation in 1842*) describes the drug. Muhammadan writers at the present day refer to it under its Arabic name *Ushar*, in Persian it is known as *Khark*.

Properties and Uses—

The SAP yields a form of Gutta-percha, it is also used as a TAN and DYE. A MANNA is said to exude from the plant, the bast FIBRE and FLOSS from the seeds are well-known fibres, the ROOT bark and SAP are MEDICINAL, a LIQUOR is reported to be prepared from the juice, the WOOD is used for gunpowder charcoal, and various parts of the plant are employed for SACRED, DOMESTIC, and AGRICULTURAL purposes.

THE MILKY SAP—A SOURCE OF GUTTA-PERCHA.

MILKY SAP,
Gutta-percha.

171

experiments were entirely conducted with *C. procera* and not with *C. gigantea*.

the first instance, by Captain (since Colonel) Meadows Taylor in a letter to the Secretary, Agri-Horticultural Society of India, Vol VIII. Afterwards Dr. Riddell republished his discovery in *The Bombay Times* in 1852. As these letters may not be accessible to persons likely to be

CALOTROPIS
gigantea.

The Swallow-worts.

GUTTA-
PERCHA.

interested by this subject, the more important parts narrating the actual experiments are quoted below:—

"The above chemical tests correspond exactly with the established results of the

by the latter.

when cool

"Comparison with the true gutta-percha gives the following results —

"Sulphuric acid—chars it.

"Nitric acid—converts it into a yellow resinous substance.

"The above chemical tests correspond exactly with the established results of the

Dr. Riddell subsequently wrote —

"As regards the above —

Madár Gutta-percha.

CALOTROPIS
gigantea.

and worked it well about with a spatula, and when cool enough to handle, kneaded it

GUTTA-
PERCHA.

percha lies in its being a good conductor of electricity, and therefore unfitted for cable purposes, otherwise it would at once assume commercial importance." (Colonel D. G. Pitcher, Lucknow.) Dr. Duncan in 1829

MADAR-
ALBAN.
172

This
again
Dr. V
closel
Ward

alban was found to agree with Payen's *Fluavil* as found in true gutta-percha. Speaking of these discoveries Dr. Dymock says: "The fact

the Drug)

A Varnish-like Exudation.—Some time ago the writer observed the *dh* plants in Chutia Nagpur completely covered with multitudes of small green insects. The bushes did not look over-healthy, and (apparently as a result of the action of the insects) a gummy liquid exuded from them and trickled down to the ground below. The writer was travelling in company with Sir Monier Williams and one or two other gentlemen, so that this curious discovery was investigated by several persons, none of whom had ever observed the same before.

VARNISH.
173

CALOTROPIS
gigantea.

The Swallow worts

TAN
Dye
174

THE DYE

Dymock and ...
skin
refer
said to be made into a dye with the powdered flour of the root

FIBRE.
Floss
175

THE MADAR FIBRES.

Fibre — This plant, as also the next species, yields two distinct fibres—

Balfour remarks that "The silky down of the pods is used by natives on the Madras side in making soft cotton-like thread. It is susceptible of being spun into the finest thread."

... the Panjáb from the follicles in mean the floss of the seeds
No efforts appear to have been made in India to improve the quality of the *madar* floss although there would seem to be no reason why, under careful cultivation and selection on the staple might not be greatly the following passage regarding woven into shawls and handker The fibre, being short, was found when ...

... Kurz, in long ropes are made of

had been able to spin the floss mixed with cotton and wool. In a letter published in the *New Report* for 1881, they state, however, that owing to the shortness of the fibre and its extreme lightness they were forced to the conclusion that "it was practically useless." As opposed to this verdict Mr. Hollins recently informed the author that he had at last fairly overcome the difficulty of shortness of staple and lightness of weight. He had ...

Bast Fibre.

CALOTROPIS
gigantea.

The Floss as a Paper-Fibre.—Several authors refer to the possibility of using this silk-cotton as a paper-stock, but unless cultivated its collection would be far too expensive to admit of this. Although wild, no single

FIBRE.
Floss.
176

from the sap, the root-bark as a medicine; are all marketable even at the present day.

The Bark Fibre—its separation &c.—The bark of the tree, when separated

Bark.
177

Royle says: "The mode of separating the fibre from the bark when separated the present oppose some Captain Hollings states it or 18 inches in length; the fibre picked from the placed side by side, and the hands. No water is used by manipulation. (see reports Major) to select the straightest branch hem dry for at

strength, they then hold the tissue of threads in one hand and separate the bark with the other. He did not find that any of the ordinary methods of separating fibre were useful, but it is probable that some of the mechanical methods of separating flax would be effectual with this fibre when in a dry state."

nearly forty years ago, in the year 1840, the first publication (now of this fibre separation of the Madá Universal Fit found service.

The writer is favoured by Mr. L. Liotard with the following note regarding his recent experiments in the separation and examination of Indian fibres, and more particularly the opinion he has now arrived at regarding *madár* bast fibre:—

"In the autumn of 1884, while testing different machines in their power of extracting the fibres of various fibre-yielding plants, I devoted attention to the *ákunda* or *madár* amongst other plants. I had already studied this shrub previously, to a certain extent, and had formed a hope-

CALOTROPIS
gigantea.

The Swallow-words.

FIBRE

ful idea of it. But the trials just alluded to have induced me to alter considerably my previous opinion. I can now confidently state that the

able utilisation on a large scale outweigh its natural good qualities

Without entering into many details, I may mention two of the chief obstacles —

"(1) the very small proportion of the fibre to weight of the stems, the proportion being only 1.56 per cent; and

"(2) the shortness of the fibres, extending as they usually do from

manufacture of paper a material is required which, besides possessing

fibre becoming of commercial importance. The attempts made by manufacturers hitherto would seem not to have been conducted on a sufficiently extended scale to justify the expression of strong expectations or to dispel such hopes.

The recent experiments conducted by the author in conjunction with Mr. Cross of Lincoln's Inn, London, have revealed the fact that by ni-

experiments made by Dr. Wight —

Name of the fibre.	Weight in lb the fibre can sustain
The fibre of <i>Cocos nucifera</i>	224 lb
" <i>Hibiscus cannabinus</i>	290 "
" <i>Sansiviera zeylanica</i>	316 "
" <i>Gossypium herbaceum</i>	346 "
" <i>Agave americana</i>	362 "
" <i>Crotalaria juncea</i>	407 "
" <i>Calotropis gigantea</i>	552 "

Cultivation of Madar.

CALOTROPIS
gigantea.

Of the fibres experimented with by Wight, the *madar* was by far the strongest.

Madar bast fibre as a paper material.—Mr. G. W. Strettell, of the Department of the General and Local Revenue for India, states that

PAPER.
179

of the finest of Indian fl.

quite opposed to this; he believes that exogenous plant of similar character

to admit of its being employed as paper, selling at £4 a ton, landed in

180

raised from seed, it is said by some to require two years before being ready for cutting; but if cut close to the ground, it grows again rapidly, yielding a second crop within 12 months from the first." (*Spon's Encyclop*)

Hoyle's account of this fibre is the most complete statement published.

Since the above was set up in proof the author has had many opportunities, in connection with the late Colonial and Indian Exhibition, held in

C. 180

CALOTROPIS
gigantea.
The Swallow worts
MEDICINE

London, to discuss with manufacturers the prospects of *madar* floss. A Lancashire spinner stated that he had now completely overcome the difficulties offered by this floss, and was prepared to purchase any quantity. Being a wild plant collected over a wide area, the supply is limited and irregular. The question now arises will it pay to cultivate *madar* floss? The spinner referred to acting upon a suggestion made to him,

fibre. Mr Cameron of Mysore writes to the author that a demand has recently arisen for this floss. Messrs Collyer & Co of London offering 5d a pound for it. This is nearly twice as much as was being paid during the Exhibition time for *Semul* cotton (see *Bombax*).

MEDICINAL PROPERTIES
181

Chemical Properties — Much difference of opinion still prevails regarding the relative medicinal values of *C. gigantea* and *C. procera*. Dr Wight and with him the majority of authors have decided in favour of the latter, but

and
this
Hand
(*Gme*)

Bark
182

Considerable difference of
bark and of the juice. The
Hindu writers seem to prefer
The *Pharmacopœia* further

C 182

Madār as a Drug

CALOTROPIS
gigantea.

April and May to remove all shade until the bark should then be carefully removed, dried, and reduced to a powder, and preserved in well-corked bottles. Moodeen Sheriff adds that the roots

MEDICINE.
Root-bark.
183

Milky-Juice.
184

Flowers.
185

Leaves.
186

nons, and to be useful in viscera, intestinal worms,

cough, acute purgative and the milky juice, stomachic appetite."

so that the fi with whey in ascites and enlargements of the abdominal viscera." "The root-bark, reduced to a paste, with of the legs and scrotum. The nerifolia are made into 'tents' tica, and introduced into sinu

Mat. Med. of the Hindūs)

According to Dr. Casanora, madār stimulates the capillaries and acts powerfully on the skin, and is accordingly recommended as a remedy in the obstinate cutaneous diseases of tropical climates, such as elephantiasis and leprosy.

work, and which bring it abreast of the most recent researches with the properties and uses of madār.

Properties of the Juice or Milky Sap.—Ainslie, Moodeen Sheriff, and most other authors record the

of
refol

the dried leaves is dusted upon wounds to destroy excessive granulation

CALOTROPIS
gigantea,
The Swallow-worts
MEDICINE.

at the present day: "A large quantity of an acrid milky juice flows from wounds made in every part of these shrubs; the natives apply it to various medicinal purposes; besides which, they employ the plant itself

juice, fresh flowers, and the root-bark are by far the best and most useful. In whatever way the milky juice is collected and dried, its smell and

dried in a sun or deep vessel for use.

they are converted into a soft mass when rubbed or bruised for the purpose of reducing them into powder; they also become soft when exposed

REMARKS. The bark should not be removed as soon as the root is dug out, but about 24 hours afterwards. The thick coat and with which the bark is covered should be removed with a knife before

Medical Opinions regarding Nadār.

CALOTROPIS
gigantea.

MEDICINE.

one of the best substitutes for ipecacuanha in this country, and has been found useful in many of the diseases for which the latter is indicated, including dysentery. As an alterative tonic, it has a beneficial influence over some forms of secondary syphilis, and is also temporarily useful in some recent cases of leprosy and a few other skin diseases. As a diaphoretic it often relieves pyrexia by producing perspiration in cases of simple and slight fevers" (*Honorary Surgeon Mudeen Sheriff, Khan Bahadur, Triplicare, Madras*)

The following abstract from a detailed account of the use of nadār juice in the cure of snake-bite may be found interesting; this is the only instance, in a very extensive series of Medical opinions, in which nadār is recommended for this purpose:—

be lessened and given every hour. In no case does it require more than

Madras)

causes great burning and produces a bad sore — *W. Watt.*

"The fresh juice is used with common salt in bruises and sprains, and the fresh leaves warmed are used as poultices in rheumatism, gout, and rheumatic antritis, to relieve painful joints. The juice is an irritant, and in large quantities an irritant poison." (*Brigade Surgeon F. H.*

Thompson) "The juice is considered a substitute inferior to that invaluable, *Moorshedabad.*) "The

In doses of from 5 to 10 grains with $\frac{1}{2}$ grain of opium given twice or three times a day, it proves as efficient as ipecacuanha in cases of dysentery. It produces great heat in the stomach, but is less liable than ipecacuanha to produce vomiting." (*Assistant Surgeon Farwant Rai, Moollan*) "I have used powder of

convulsions, and also in wandering of the mind during fever. The leaves are also applied externally to relieve pain, being for that purpose kept warm by hot, dry applications." (*Rev. A. Campbell, Santal Mission, Chutia Nagpur*)

CALOTROPIS
gigantea

The Swallow wort

MEDICINE

native physician's in syphilis. The flower buds, in doses of 5 grains, combined with black pepper and catnip, is used in cholera, dysentery, and in cholera. The leaves are used in the treatment of the above diseases. (Hospital Assistant La) The bark is said to be useful in the treatment of the above diseases. (Surgeon Major E. W. Levinge, Rajamundry, Godavery District) "The bark of the plant is used in the treatment of the above diseases."

bark of
are used
secondar
John A

C 186

Madár Manna.

CALOTROPIS
gigantea.

ed, are applied to the "scrotum in epididymitis" (*Surgeon James McCloghry, Poona*) "The green leaves, tied in bundles and cut into halves, are used as a for oil has been by the native *Madras*) "alterative, and of foot, the natives heat a brick and place half a dozen leaves over the

MEDICINE.

antiperiodic. The flowers, made into poultice, relieve pain in the heels." (*Surgeon John Lancaster, Chittore*)

It is probable that the above special medical opinions refer to both this and the next species. As already stated, the majority of writers agree in regarding both as of equal medicinal merit. The reader is referred to *C. procera* under "Medicine" for one or two special opinions regarding that species.

MADR LIQUOR AND MANNA.

Food and Liquor.—The *At* is said by the Arabs and Persians to yield a sugar or manna: this fact is briefly alluded to by *Royle* (*Him.*

MANNA.
187

species of *Elaeagnus*)
hal, for a description
" (*Dr. W. Dymock*,
hexarnish-like juice

LIQUOR.
188

It is the la
expected;
ferment th

Mr. L.

"Barth st
this plant
whether ti
liquor, or
lar to hope

it may be used, the practice of employing *al* juice (or *bar*) in the preparation of intoxicating liquors should be known to the inhabitants of Western India in common with certain African tribes, but apparently be un-

CALOTROPIS
gigantea.
The Swallow-worts
LIQUOR.

known to the people on the eastern side of the peninsula. This would seem to point to the probability of the practice having reached India from Africa, and so, as far as India is concerned, and from a historic point of view, it would be of comparatively little interest. It should be remembered, however, that the sacred *Soma* of the ancient Sanskrit writers has by many botanists been associated with a species of *Sarcostemma*, a genus belonging to the same tribe of Swallow-worts, and not very far removed from *Calotropis*. We have abundant evidence of the antiquity of the

above.

TIMBER.
 189

TIMBER

Structure of the Wood The timber is a ...

DOMESTIC.
 190

DOMESTIC AND SACRED USES

Domestic and Sacred Uses — MANURE — "The leaves and stalks serve for reclaiming *reh* (covered with saline efflorescence) lands. These leaves are strewn about the ground and covered with earth, and then crushed by being stamped ... When the undated as the nat years bec. (Lisbon, *Us Pl*, Bomb, 233) ... after as a manure for paddy field manured will yield a much superior leaves and twigs are used in Forester, IX, 35) Col Pitcher cally examined the *madar* leaves in order to discover whether or not they

corolla and string into garlands remonies The following extracts omby will be found instructive — XX, in the narration of *Gallapa* tree is mentioned to be the trans

The Swallow wort

CALOTROPIS
procera

"It is ordered in the *Sivaram Mahatma* to worship *Māruts* (who is also known as *Hanuman*), or the Monkey-god, on every Saturday, with a garland of the flowers of this tree, which are then offered to him. The twigs are also ordered to be used as substitutes for tooth brushes in the *Smritisar Granth*. They are also employed as *Samidhis* for the feed-

ption of this plant, and
nd Tartars make their

Calotropis procera, *R Br*, *Fl Br. Ind*, *IV*, 18; *Wight, Ic*, t 1276

191

Syn.—*C. HAMILTONII*, Wall

Vern.—*Safed* *dl dl dg*, *madder*, *dhadd* *hind*, *dh shakar ul dhar*, *shakar-ul-dighal*, *Pb*, *Spulmer*, *spalmak*, *pashland*, *TRANS-INDUS*; *dh*, *SIND*, *Mandira*, *MAR*; *Alarka* *SANS.*; *Vellerku*, *TAM*, *Ma-jo-pin*, *mechobin*, *BURM*; *Spalmakka*, *AFG.*

Moodeen Sheriff, as well as *U O Dutt*, gives the same vernacular names for both the species of *Calotropis*

References.—*Brandis, For Fl*, 331; *Kurz, For Fl, Burm*, II, 200; *Gamble, Man Timb*, 215, *Dala & Gibs, Bomb Fl*, 140; *Stewart, Pb Pl*, 144, *Aitchison, Cat Ib Pl*, 20; *Voigt, Hort Sub Cal*, 540;

Guide to the Museum, p 97

Habitat.—A shrub found in the drier parts of India, chiefly in the Sub-Himalayan tract, from the Indus to Jhelum, Oudh, Central India, and the Deccan, also in Burma and distributed to Persia and tropical Africa

Gum.—As in preceding species

Medicine.—As under *Calotropis gigantea*. Root of this species specially mentioned as used by the Pathans for tooth-brush, having the merit of

GUM
Gutta percha.
102
MEDICINE.
Root
103
Milk
104

Special Opinions.—§ "The fresh milk is employed in the Panjab for the purposes of infanticide [The mouth of the uterus is brushed with

Fodder.—Used as a camel fodder (*Sind Gaz*, 522) According to Dr Stocks in his *Plants of Sind (Records of the Govt Bombay, XVII. 606)*, one of the four plants which the camel will not eat (See Camel Fodder).

Domestic Uses.—In Oudh this species is regarded as an ill favoured weed, notwithstanding its usefulness

Flowers
105
FODDER
106
DOMESTIC
Tooth
brushes
107

The Camel.

CAMELUS.

been introduced to Australia and to New York, where it appears to have taken kindly to the sandy expanses of Nevada, a region in which thorny bushes abound, similar to those on which it browses in India and other warm countries. The Bactrian camel, on the other hand, requires a colder

Lake Baikal. In Central Asia both species are found, as also the hybrid between them. There are numerous recognised breeds of both species, and there are even dromedaries so acclimatised to alpine rocky regions, that they are prized as beasts of burden by the inhabitants of such countries. The Bactrian camel is smaller than the dromedary, has longer, darker, and more plentiful hair, and the pads of its feet are much harder (an adaptation doubtless to the rocky region it inhabits) than those of the Arabian camel. Palgrave, however, informs us that dark-coloured or

A FOSSIL
CAMEL.

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light upon the original home of the animal is a matter of speculation. The Siwalik mountains, which skirt the foot of the Panjáb Himálaya, have now been satisfactorily established as belonging to the *pliocene* period

animal only occurs there in a state of domestication and need not by any means be the actual descendant of the Siwalik camel. It is remarkable, however, that no one has ever seen the one-humped camel in a wild state, and unless we are to accept the somewhat extreme view that they may after all be but varieties of one species (hence producing a fertile hybrid or cross-breed) Prejevalsky's home of the two-humped camel need have

WILD
CAMELS.

205

CAMELUS.

The Wild Camel.

... which
... himself
... nerally
shot the so-called wild camel ...
accepted that a wild two humped small and very woolly camel does exist
in the region referred to

Vernacular Names — *Chameau*, FR , *Kameel*, GER , *Kamelos*, GR ,
Camello, IT and SP , *Camelus*, LATIN , *Unt*, or *ut*, HIND , *Yamal* ,
gamal, ARAB , *Ottagam*, TAM , *Lots-pitta* or *wonte*, TEL , *Unta*, MALAY.

The Names
given to the
Camel.

	To 1 year	To 2 years	To 3 years	To 4 years	To 5 years	To 6 years	To 7 years	To 8 years
Male	<i>Toda</i>	<i>Masat</i>	{ <i>Trishun</i> , <i>Lthak</i>	<i>Chhatr</i>	<i>Doak</i>	<i>Chhiga</i>	<i>Nesh</i>	<i>Nesh</i>
Female	<i>Tods</i>	<i>Masat</i>	<i>Puraf</i>	<i>Lhars</i>	<i>Trokar</i>		<i>Kuteli</i>	

M Kostenko tells us that in Turkistan the two humped camel is called
tuya and the one-humped *nar-tuya*

Reference to ... Chesney,
... oltinger
... Preje-

Breeds.
206

BREEDS AND RACES OF CAMELS.

the *rahars* is much more freely supplied with hair, is of lower stature as a

The Camel.

CAMELUS.

patches, presenting a mangy appearance, this would probably be restored on the return of cold weather, there were only a few specimens bought by officers above Kandahar as curiosities, so that there was little opportunity of judging as to their qualifications for transport.

MORTALITY AMONG THE CAMELS USED IN THE AFGHAN WAR — The verdict passed by the various officers whose opinions were called for on the subject of the losses of camels during the Afghan campaign was most pronounced and uniform. The plains camels were preferable for the transport service on the hotter or Indian side, but were quite

BREEDS.

Mortality.
207

death appears to have been caused through some affection of the lungs. The hill camels perished through the heat of the Bolan pass and the plains camels by the cold of the higher regions, but both had previously endured privation and excessive fatigue. It is reported that of one consignment of Panjáb camels nearly 39,000 died or were lost by desertion, but it is probable that if the losses among the Sind, Baluchistan, and other

hot sandy regions, which has given to this beast of burden the appellation of the "ship of the desert," while others have been so far altered in their habits and character as to be useful on rocky and mountainous countries and be even capable of sleeping on ground from which the snow has been only removed for their accommodation. The principal breeds of

AVERSION TO
WATER

ing Indian camels may be found useful. According to the *Panjab Gazetteer* for 1881, the camels known as "the much light" are known as "The female camel from the mic from that date for 20 years, and during the same period the male may be worked but the female is rarely laden. A good male camel will carry a load of 8 maunds, and he will take double marches of from 20 to

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CAMELUS

The Camel.

BREEDS.

sized head, thick skin, and is of a brown colour. The *Uanaa* camel is grey, and has a large head, small mouth, and thin skin. The *Hazara* camel has a small tail and is of a red colour. This is the worst of the three kinds, as it has no endurance on a journey. The *Ganda* is the best. "The camels of this district are of no use for riding." "Large herds go down annually to Bhivani for employment." "If well treated a camel will live for 40 years." The coupling season is from December to March and at the end of the season the female has her first young one,

Gestation.

bearing 9 or 10 one is weaned, but it begins to suck grass when it is only 22 days old. A camel will feed her young and yield 12 seers of milk a day besides. The owner milks the cow twice a day, leaving two teats for the young one. The milk yields curds and butter milk but not butter. The camel is a very useful animal.

camels are superior to those reared in the Dera Ismail Khan district, "No good riding camels are being imported from the she-camel will have had her for Thal. The Chenab report says, believe that

Sind,

210

says of the domestic animals the one-humped camel takes the first scarce, but recently seen. his Arabian The Kar-ivision—one which in pace and hardness is said to vie with that bred in the Thar and Parkar district."

Rajputana
211

RAJPUTANA CAMELS—The Bikaneri camels are famous all over India for being the best.

Camels are of various sizes, the of the worst like riders.

Bombay,
212

BOMBAY CAMELS—Very little can be learned regarding the Bombay camels. In the Gujarat (*Gazetteer, Ahmedabad District*) it is stated that the Ahmedabad camels are less prized than those brought from Mārwar.

The Camel.

CAMELUS.

"Those, especially the very swift"
 miles a day, are used for riding!
 war camels is found in Dhandhuk
 recorded that excellent camels are
 the Machu Kántha, &c. "The
 freely, and graze in the swamps"
 young horses, and in cases of diseased spleen"
 The idea that camel's
 milk strengthens and improves foals is very general all over the parts of
 India where the camel is met with, but the above statement that the camels
 of Kathiawar graze in the mangrove swamps is remarkable, as in all
 other districts of India the opinion prevails that the camel has a strong
 dislike to water and will not thrive in damp, swampy regions. So general
 is this belief that Mr Darwin, in his "Animals and Plants under
 Domestication," was led to allude to the fact as pointing to the desert
 origin of the animal, since in domestication it has not been able to conquer
 its aversion to water. The Kathiawar breed may have overcome this
 feeling just as the one-humped camels reared in Afghanistan and other
 cold mountainous countries seem to have lost to a large extent their love

BREEDS.

Camels
feeding in
swamps.

the great muscular development of the fore as compared with the hind
 legs

ARABIAN CAMELS—Palgrave (*Central and Eastern Arabia*, I, 324)
 says "The camel and the dromedary in Arabia are the same identical

Arabian
213

exists indeed, but it is neither an Arab dromedary nor camel, it belongs
 to the Persian breed, called by the Arabs '*Dakhlí*' or 'Bactrian'."
 Palgrave further adds that to see a dromedary it is necessary to go to
 Arabia, "for these animals are not often to be met with elsewhere, not
 even in Syria, and whoever wishes to contemplate the species in all its
 beauty must prolong his journey to Omán, the most distant corner of the
 Peninsula, and which is for dromedaries what Nejed is for horses." Ac-
 cording to this definition the riding camels of Rajputana are the drome-
 daries and Bikanir the Omán of India.

RUTTING AND BREEDING

There seems to be much difference of opinion as to the duration of the
 period of gestation. According to some writers the female carries her
 young for 11 months only, by others for 12 or even 13 months. She
 comes into heat when she is three years old, and bears one foal every 2
 years or so for 15 to 20 years. She suckles her young for 12 months,
 but about 20 days after birth the infant animal commences to nibble the

Breeding
Gestation.
214

CAMELUS

The Camel.

grass The period of the year when rutting commences seems to have
 in India this occurs from July to September. The male
 refuses food and water and becomes unmanageable. The female is rarely
 worked but is reserved for breeding purposes, and to supply the milk
 on which the camel breeders largely live. If well cared for a camel will
 live for 40 to 45 years.

POWER OF ENDURANCE

Privation
215

Privation from both food and drink—Incidentally allusion has been

Eating
poisonous
plants

he is not normally so, privation seems to have that effect on him. The
 camels from the plains of India at all events were observed to eat plants
 which the hill camels would not touch, and which have the local reputa-
 tion of being poisonous to the camel. In another paragraph will be

Privation
from Water
216

the other hand, numerous writers affirm that three or at most five days
 without water will kill the camel unless the fodder given is green and
 moist. Kostenko tells us that camels eat only during the day they eat
 quickly and are satisfied with 2-3 hours grazing. If subjected to pri-

Death from
Depletion
217

The Hump

LOAD, &c

LOAD, DISTANCE, AND RATE OF MARCHING.

The carrying power of the camel will depend to a great measure on the
 stock it has come from, and the climate in which it is to be employed. The
 Central Asiatic camel is as a rule, more vigorous and enduring than either
 the Indian or African. The load a camel will bear greatly depends on the

C. 217

The Camel.

CAMELUS.

nature of the work or which it is employed. For a short distance, and in its usual avocation, a healthy camel will carry about 1,100 to 1,200lb but where produce or baggage has to be carried a distance, 300 to 400lb will

Average load,
400lbs
218

300 to 500lb, but in the latter case the Bactrian or two-humped camel is employed

Colonel J. I. Boswell says the Panjáb camels known as *Sangar* are

Prime age
4-12 years.

hour. If these figures be correct camel trots much faster than t

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tion is said to be very easy, but the Bactrian extremely disagreeable. Swift camels are reported to get over 100 miles a day at a push, but the ordinary journey which they will keep up day after day is about 40 to 50 miles. Fortune mentions an instance of an Arab having accomplished a journey of 225 miles in 28 hours, thus keeping up 8 miles an hour continuously. General Chesney mentions that he crossed from Basrah

hours, the variations being accounted for by the slightly different tracts followed

The *Kashgar* camels are used for the same purposes, the shafts being yoked to the plough. When so yoked instructed cart they is sometimes seen

Camels in
harness
221

DISEASES.

The limited space at the writer's disposal has compelled the present article to assume the form of little more than an abstract of the literature on the subject. He is thus precluded from attempting to give even the commonest facts regarding the diseases of the camel or their modes of treatment. It is generally believed that the camel is liable to a number of diseases peculiar to itself, but is not subject to the attacks of infectious diseases which carry off other cattle. For military purposes by far the most

DISEASES
222

CAMEL FODDERS

Plants eaten by Camels

serious disorder is the result of careless loading and a badly fitting saddle,

Sores on the
Back.

other It has already been stated that many of the camels employed in the Afghan campaign succumbed to heat and others to cold, but it has been contended that the privation they endured for some time previously was the actual cause of death. This seems to be proved by the immunity enjoyed by the camels belonging to the officers, most of which returned in

the best treatise that has appeared.

Kostenko says the disease known in Turkistan as *Sargo* causes the soles of the animal's feet to fall off, and he adds, that as with all the other diseases to which the camel is subject, this is treated by the nomads by freedom from work and good food

FOOD AND FODDER.

FOOD AND
FODDER.
223

To keep a camel in health it should be allowed 6 hours' grazing and

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it in
eove
the
beca
treat
how
are ;
latte

object will therefore be met by furnishing two lists, viz, the plants mentioned by authors as more peculiarly camel fodders and the plants of which the camel will either not eat or on which at least it cannot subsist or which are poisonous to it

CAMEL FODDERS.

224

1. *Acacia arabica*, Willd. . LEGUMINOSÆ.
2. *A. Farnesiana*, Willd
3. *Ægiceras majus*, Garlin. . MYRSINÆ.
4. *Albizia Lebbeck*, Benth. . LEGUMINOSÆ
5. *Alhagi manroem*, Desv. . LEGUMINOSÆ

THE CAMEL THORN OR SHÚTAR KHÁR

Vern — *Jawasa* or *jantash* or *yawisa*, *jawansa* HIND PB, BOM, *Tamiya*, *jawa*, *jawasa* *yamen*, *Pa*, *Dulallahá* BENG, *Kandero*, *SIND*, *Dura-ladha* *girikarnika* *yawasa* SANS, *Skutar khar*, *PERS*, *Alhajm*, *ARAB*, *Zas*, *PUSHTU*; *Zog*, *sonan*, *TRANS INDUS*

CAMEL FODDERS

Plants eaten by Camels.

- FODDER. 22 *Halocharis violaceæ*, Bunge . CHENOPODIACEÆ
 23 *Indigofera pauciflora*, Delile . LEGUMINOSÆ
 24 *Kochia indica*, Wight . CHENOPODIACEÆ
 25 *Lippia nodiflora*, Rich . VERBENACEÆ
 26 *Leptadenia Spartium*, Wight . ASCLEPIADACEÆ
 27 *Lycium europæum*, Linn . SOLANACEÆ
 28 *Melia Azadirachta*, Linn . MELIACEÆ
 29 *Mimosa rubicaulis*, Linn . LEGUMINOSÆ.
 30 *Mollugo hurta*, Thunb . FICOIDEÆ.
 31 *Phoenix dactylifera*, Linn . PALMÆ.
 32 *Pistacia integerrima*, J L Stewart, ANACARDIACEÆ
 33 *P. mutica*, Fisch & Thely
 34 *Prosopis spicigera*, Linn . LEGUMINOSÆ
 35 *Psoralea plicata*, Delile . LEGUMINOSÆ
 36 *Quercus ilex*, Linn . CUPULIFERÆ

THE HOLLY OAK

The Oak

Vern — *Charrey, seret, balât shâh balut*, AYO, *Châr, ban, kathân ban, irri, yira khareo*, PE, *Spercheret, pargui, kharanja*, TRANS-INDUS.

occur in Pishin

37. *Rubia tinctorum*, Linn . RUBIACEÆ
 38 *Salicornia brachiata*, Roxb . CHENOPODIACEÆ
 39 *Salsola foetida*, Del . CHENOPODIACEÆ

Moti lani.

Vern — *Moti lani* PE, *Mitho lani, samungaar lani*, SIND

A camel fodder, but also used in the preparation of *khâr sajjî*, especially near Jhelum

- 40 *S. Kali*, Linn
 41 *Salvadora oleoides*, Dcne . SALVADORACEÆ.

Vern — *Kabbar, ghar, diar, jâl, vani jhal, ughai, koku, pilu, pill, plewane, mithi van*, HIND, PE, TAM; *Pilâ, MAR*, *Sadni djar, mithi diar*, SIND

Pilu

sweetish and is largely eaten by the natives
 The leaves serve as fodder for camels

Plants eaten by Camels.

CAMEL FODDERS.

42. *Salvadora persica*, Linn

FODDER.

Vern.—*ḡit kauri dān*, *kauri-jāl*, *chhoti dān*, *Pā*, *Jāl*, *N W P*, *ḡadār* (kudr by Stocks), *khori dīhar*, *khari dīhar*, *SIND*, *Pekli*, *parago-wenki*, *TEL*, *Opa*, *ughat*, *TAM*

... of the drier West Provinces, ... and very small ... omatic smell, and

The shoots and leaves are pungent, and are occasionally eaten as salad, given as fodder to camels.

43. *Suaeda fruticosa*, Forsk., CHENOPODIACEÆ

Vern.—*Chhoti lani*, *lanai*, *phesak lani*, *baggi lani*, *dāna*, *CIS INDUS*, *Zamdi*, *TRANS-INDUS*, *Aout lani*, *usak lani*, *lanai*, *SIND*.

A sub-erect bush, common in North-West India from Delhi to the Indus, and distributed westward to Africa and America

Employed in the preparation of *khār sījī*, but also extolled as a camel fodder. Major Clifford says, it is abundant at Chuckuk in Pishin

Chhoti Lani.

44. *S. maritima*, Lamour., and *S. radiflora*, Moq.45. *Tamarix gallica*, Linn., TAMARISCINÆ.

Trianthema.—Four species belonging to this genus frequent the sandy tracts of the Panjāb and Sind, and, according to Stocks, one or all are known as *Fysur lani*, they are regularly eaten by camels

The following are the better known species of this genus.—

46. *Trianthema crystallina*, Vahl, FICOIDEÆ.47. *T. monogyna*, Linn48. *T. pentandra*, Linn.49. *Vitis carnosia*, Lam., AMPELIDEÆ.50. *Zizyphus nummularia*, W. & A., RHAMNEÆ.

Vern.—*Malla*, *bīr*, *bīrar*, *phari*, *N W P*, *Ganger*, *yangra*, *SIND*, *Malla*, *tokni bīr*, *marabēr*, *gand*, *pharberī sarī*, *birola*, *Pā*, *Karkana*, *TRANS-INDUS*, *Karkanna*, *ATG*

A densely branched, small bush, met with in the drier parts of India

Mr. F. Kinsman, of the Telegraph Department, informs the writer that this plant may be regarded as the most important camel fodder in a great part of Rajputana. The natives, to cut the plant, have invented a peculiar axe, with the cutting edge turned, so that it is parallel to the

Rajputana Fodder.

51. *Zygophyllum simplex*, Linn., ZYGOPHYLLÆÆ.

PLANTS POISONOUS OR AT LEAST NOT WHOLESOME TO CAMELS

1. *Acerus Calamus*, Linn., AROIDEÆ

Vern.—*Bach*, *HIND*, *Vekānda*, *BONS*; *Vaj*, *ARAB*, *Agri turki*, *PERS*, *Bari boj*, *Pā*

CAMEL FODDERS. Plants poisonous or not wholesome to Camels.

POISONOUS

Bach Akri.

A semi-aquatic plant, met with in damp places in India, at altitudes from 3 000 to 6 000 feet

... .. ten, during
... .. is the same
... .. which may
... .. Mr Steel
... .. re not quite so
... .. were poisoned
... .. bly be *Acorus*

Calamus. It is necessary to add that the name *akri* is in the Panjáb applied to *Withania coagulans* (which see), a plant which bears no resemblance to an *Iris* whatsoever.

2. *Calotropis gigantea* and *C. procera*, R. Br., ASCLEPIADACEÆ.

Vern—*Al*, *madár*, HIND, PE and SIND., *Spalmet*, *spalmat*, AFG; *Ushar*, ARAB, *Khark*, PERS

Stocks enumerates this among his four plants which the camel will not eat, but the *Sind Gazetteer* (page 522), under the account of the district Mehar, states that it is a camel fodder. It is probable Dr. Stocks is correct.

3. *Cannabis sativa*, Linn., URTICACEÆ4. *Euphorbia nerifolia*, Linn., EUPHORBIACEÆ5. *E. Royleana*, Boiss.6. *E. Tirucalli*, Linn.7. *Nerium odorum*, Solander, APOCYNACEÆ

SWEET-SCENTED OLEANDER

Vern—*Kaner*, *kanira*, *ganhira* HIND, PE, *Karabi*, BENG, *Kanhera*, *kanir*, BOMB, *Difti*, ARAB, *Akar sakrah* (the Assesbane), PERS

A common plant in the

this plant

(Zow or)

proves fat

officers h

rate of ca

however,

poisonous

wholesom

against the eating poisonous herbs, as was suspected by some, when the mortality was so great at Quetta (Compare with *Acorus*)

8. *Othonnopsis intermedia*, Boiss., COMPOSITÆ

Vern—*Gungu*, PUSHTU

Mr J H Lace, of the Forest Department, Quetta, reports that the *Biluchis* regard this plant as poisonous to the camel

9. *Peganum Harmala*, Linn., ROTACEÆ.

Vern—*Harmal*, ARAB, *Isband*, PERS., *Spelane*, *harmal*, PE, *Isband*, HIND

A small bush, much branched and densely clothed with dissected leaves. The whole plant strongly scented.

The camel will not eat this plant.

Economic Products derived from the Camels.

CAMEL-HIDE.

10. *Withania coagulans*, *Dunal*. SOLANACEÆ.

Vern.—*Akri, panir, Pr*, *Panir*, *SIND*, *Panir bad*, *PERS*.

CAMEL-FLESH AND PRICES PAID FOR THE ANIMAL

PRICES
226

It is stated by writers on the subject that camel-flesh is very tough, but that the flesh of the sucking camel is passable. The camel owners

the northern, and the hair is finer. They are cheaper in proportion than sheep, twenty-five to thirty shillings is an average price."

CAMEL-HAIR.

HAIR.
227

The amount of hair or wool which the camel possesses seems to be inversely to the warmth of the country in which it is found. The two-humped camel has a longer and more abundant crop than the single-humped, and the wild camel most of all. It has already been stated that the natives near Lob-nor are said to hunt the wild camel on account of its hair, which is much valued for its softness. The single-humped camel, acclimatised to colder regions, loses its hair when brought into

chogas of a cheap kind, but they are soft, warm, and useful. The long hair is not made use of in India, but "it is employed in Europe for making paint brushes." In the manufacture of artists' hair-brushes or pencils, in addition to camel-hair the fine hairs of the sable, the mink, the martin, the badger, and the polecat are also employed.

CAMEL-HIDE.

HIDE
228

Lower Provinces (where the camel does not occur), of cow, buffalo, or

CAMEL'S MILK.

Economic Products derived from the Camel.

Kuppas
229

horse hide, but the writer can discover no account of the manufacture of the immense number of skin or leathern oil jars which form an almost characteristic feature of every bazar in Lower India. It would, however, appear that other skins are sometimes employed in addition to camel-hide, but as they are more expensive and more difficult to work, camel-hide is mainly used. The smaller ornamental jars employed for the

Kuppl
230MILK.
231

about R2 to R3 a piece.

CAMEL'S MILK

It is scarcely necessary to enlarge on this subject further than has

Halwa.
232

seems to be done in the article although it does not appear to be any where made in India. It is known in the bazars as *muscat-ka halwa*.

C. 232

The Tea plant.

CAMELLIA.

CAMELLIA, Linn ; Gen Pl. I, 187

TEA.

233

radicle short, superior

The genus *Camellia* is named in honour of Camellus (Joseph Kamel), a Moravian Jesuit and Asiatic explorer. The cultivated or ornamental *Camellias* are mainly derived from *C. japonica*, a native of China and Japan, this was introduced into Europe in 1740. The *Camellias* are easy of cultivation in warm temperate climates, the best soil being a mixture of sandy-loam and peat. The pots should be well drained and the plants

Mok-les

The seeds of *C. drupifera* (formerly known as *C. oleifera*, Wall) yield the largest amount of oil, but all the *Camellia* seeds contain a useful sweet oil. By far the most important of the *Camellias*, however, is that from which Tea is obtained.

Linnaeus, in the middle of the eighteenth century, gave the Tea plant the name of *Thea sinensis* (*T. chinensis*), but soon after, in the second edition of his *Species Plantarum*, he deemed it advisable to assume that the green and the black teas of commerce were obtained from different plants. He accordingly called the plant from which he supposed the green tea was obtained *Thea viridis*, and the black tea, *Thea bohea*, the latter specific name being derived from the "Wu-t or Bú-t Mountains in the

scribed as a separate species under the name of *Thea assamica*, Masters, but recent investigation has proved this to be but a large-leaved subtropical form of *C. theifera*, and it is open to doubt if it be even indigenous

CAMELLIA

The Tea plant

TEA.
History of
Assam Tea

It is most probably only an escape from early cultivation, so far as Assam is concerned. The first scientific tea explorers of the forests around Sadiya, namely, Drs. Wallich, McClelland, and Griffith, describe it as

Government cultivation of tea, since the stock found in Assam was of such inferior quality. In a correspondence with Assam tea planters, however, the writer has had this idea of the inferior quality, or rather degeneration, contested on the ground that the China plant, on its introduction into Assam, became smaller instead of larger leaved, whereas the Assam supposed escape from an early cultivation showed no such tendency and was on this account presumably a distinct plant from the China. This

Manipur Tea
234

region of the Assam and in the very latitude of the accepted Chinese home of the tea plant —

and cultivation, was the
seen cultivated in China
d a plant which in many
s to be seen in the damp

The Tea plant

CAMELLIA

The cross fertilization of these two forms gave origin to the popular race known as the 'Assam hybrid,' a term which scientifically must be viewed as incorrect, since it is not a cross between two species but between two forms of the same species. It is more accurately a

TEA
Assam
Hybrid
235

peculiarities of this widely cultivated "hybrid" stock (such as the ease by which it is propagated by seed), but it leaves absolutely the experimental production of a real hybrid between *C. theifera* and some of the other truly Indian wild (though hitherto non tea producing) species, a problem that would seem well worthy the attention of the practical planter. Whether any improvement in quality or healthiness of stock would result from the production of such a hybrid remains to be seen. Indeed this may

ing of the manufacture of tea, so that the past 50 years of Indian tea cultivation have seen no new forms produced and perhaps little improvement in the methods of cultivation.

It is constantly protested by the planter that he can distinguish the Manipur stock from the Assam, the China, and the hybrid: the argument being that, therefore, they are quite distinct plants. The contention here urged does not for a moment discountenance the idea that these forms are recognisable. Local varieties exist of every widely distributed plant. Cultivation will modify almost any plant and even produce departures from the original type that are constant under certain conditions of climate and soil.

so-called Assa

cabbage may

the cauliflower, but, in spite of all it is the forms of the tea plant that do not possess so high a claim as these well known vegetables to be regarded as even varieties of a common species. The term variety is here used of course in its strictly scientific sense and not in the loose popular manner

Recognisable
cultivated
forms
236

wild plant

Assam
Indigenous
237

CAMELLIA.

The Tea-plant.

TEA. belongs to the section *Thea* of the genus *Camellia*, viz. *C. caudata*, a species n
Sylhet a
this spec
hybridism
tested?
that this

First Assam
Tea Garden

have been disposed of. The Assam planters are nearly unanimous in saying that the indigenous Assam or even the Manipur is superior to the China-Assam hybrid. Dr. J. Berry White, for instance, in an instructive paper read before the *Society of Arts* (May 27th, 1887) remarks that—"It is a matter for profound regret that this garden (Chabwa) did not share the fate of its predecessor, for it proved the chief means of disseminating the pest of Assam—the miserable China variety—all over the province, not only by means of seed, but, owing to its prolific inflorescence, which were impregnated which now forms but also in Ceylon either for the interbreeding between it and the plant found in Assam. Other planters state that a first class hybrid is, however, at least as profitable a plant to grow as the pure Assam, since it will yield better at the beginning and the end of the season when the weather is too cold for the indigenous plant."

climate? Is the China plant, in other words, suited to Assam, and if not, is it possible to cross it with the Assam plant?

* This doubtless means prolific flowering. the flowers are axillary, solitary

The Tea plant.

CAMELLIA
drupifera.

TEA

and enumerated the various scientific and planter's names given to these, it may be as well to define very briefly each of the Indian species of *Camellia*, discussing the various economic and industrial properties before giving a brief history of the rise and present position of the Tea Industry. The reader is referred for further information to the article TEA.

Camellia caudata, Wall, Pl As Rar, III, 36, Fl Br Ind I,
203. TERNSTROMIACEÆ

Species of
Camellia
238

References.—*Griff Natul IV* 550 t 601; *Trans Agr Hort Soc Ind*,
1, 1839 t A, *Aura Fl Burm*, I 109 *Gambles Man Timb* 30

Habitat.—A smallish bush, found in the Bhután, Mishm, Khasia and Sylhet hills, and in Martaban, at altitudes from 3 000 to 5 000 feet above the sea.

Botanic Diagnosis—*Leaves* with tapering points hairy beneath and only 3 to 4 by $\frac{1}{4}$ to 1 inch in size. *Flowers* white solitary, nodding with the stamens and styles hairy, as also the outer surfaces of the sepals and petals, sepals persistent.

This species is apparently not used for any industrial purpose, but it

C drupifera, Lour , Fl Br Ind, I 293

239

Syn.—C KISSI Wall As Res XIII 429 Jour, As Soc Beng
 II 49 t 2 Pl As Rar III 35 t 255 C KEINA Don Prod Nepal
 224 C MASTERSIA Griff, Notul IV, 539 C SIMPLICIFOLIA Griff,
 Notul IV, 560 t 604 C. CAUDATA, Griff (non Wall); C OLIFERA,
 Wall

Vern—*Kiss lingua Nep*, *Chauling* BHUTIA and LEPCHA

References.—Kurz, *For Fl, Burm* 1 109, *Gamble Man Yimb*, 30
also *Darjeeling List* 9

Habitat—A large evergreen shrub with slender much divided branches met with in Nepal and on the Eastern Himalaya generally in Bhután the Khasia hills, Northern Cachar hills Manipur Ienasserim and the Andaman Islands at altitudes from 3 000 to 8 000 feet above the sea.

Botanic Diagnosis—*Leaves* below and having also a long towards the apex, and often re branous scales embracing the of the cherry laurel. *Sepals* silky externally, deciduous (i.e., not persis tent). *Petals* emarginate. *Stamens* glabrous. *Styles* nearly free, woolly at the base.

OIL,
240

samples of the oil from tea seed were shown and were much admired. Without any appreciable extra trouble this species might be reared as a hedge and yield a fairly remunerative oil crop at the same time. It is a

C. 240

CAMELLIA
theifera.

The Tea-plant.

TEA.

non-drying oil of a superior quality; it is used medicinally in Cochin

Sasangua Oil

241

sure, the pulp being boiled and again pressed
 The leaves are largely used by Japanese ladies for washing the hair.
 carried seems uncertain,
 owe more to the flowers

TIMBER.

242

ven-grained; weight 60lb

243

Camellia lutescens, Dyer; *Fl. Br. Ind.*, I., 293.

Habitat.—Mishmi Hills.

Bot.—*Camellia lutescens* Ait.

Leaves

ers erect

pubesce

Very little is known of this plant.

True Tea
Plant.

244

C. theifera, Griff., *Notul.* IV., 558, t 601; *Fl. Br. Ind.*, I., 292.

TEA, Eng., THÉ, Fr.; THI, Germ.; TE, Dutch, Il., Sp. &
 Scotch; CHAI, Rus. & Turk.

Sy

Vern.—Te, chá, CHINESE (Crawford regards the word *te* as of Malay origin, but Yule says it is Chinese, having, like many other words, reached the west through the Malaya), Chá, ARAB, PERS., and HIND; Chedean, COCHIN-CHINA (according to Loureiro), Rata-tekola (according

The Tea-plant.

CAMELLIA
theifera.

to Moon) is the Ceylon name for *Thea bohea*. Balfour enumerates the following names said to be Chinese—*Ming-tsu, tu, ku-cha, kia, sheh*, and *chuen*, he further mentions the following Indian vernaculars, but these would appear to be tea garden names of a modern origin—*Dullicham* (white wood), *CACHAR*; *Phlap* or *Elap*, *missa phlap* (in Muttack), *Hillat*, ASSAM.

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TEA.

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of Indian
Tea.

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CAMELLIA
theifera

The Tea-plant.

TEA Bibliography

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The Tea plant.

CAMELLIA
theifera.

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Lon, 1836

Exh, 1885
ulturist and

734, 1887

II, pp 181

98, 102, 104,

105, 140, 155, and 160, VI, p 10, VII, p 1 (and Pro pp 45,

59), VIII, pp 60 and 182

Journal Agri-Horti Soc, India (old series) Vols I, p 288, II, p

323, App p 408 (Chittagong), p 337 (Assam), p 5 (Paraguay),

47, 63; 1875-76, p 20, 1876-77, pp 11, 49, 1877-78, p 32,
1878-79, pp 9, 33; 1879-80, p 42, 1880-81, pp 39, 54, 1881-82,
pp 47, 76, 1882-83, pp 61, 92; 1883-84, p 39, 1884-85, pp. 21,
47; and 1885-86, pp 28, 38, 39

Habitat—As pointing to a common origin for the cultivated plant it is note-worthy that the name *Chhá* or some form of that word is given to tea in India, Persia, Russia, China, and Japan. But travellers in China do not appear to have observed the wild plant, and DeCandolle accordingly has come to the conclusion "that the tea plant must be wild in the mountainous region which separates the plains of India from those of China, but the use of the leaves was not formerly known in India." He further admits that "it is probable it exists also in the mountainous districts of south eastern China, where naturalists have not yet penetrated." Loureiro (*Fl Cochín*, p 414) says it—

China "cultivated and uncultivated,"
ceolate and acutely serrate, a descrn

Distribution
of Tea Plant.
246

CAMELLIA
theifera

The Tea plant

TEA

from those of China," it has been established beyond doubt that one if

and Burma) the plant exists as a forest tree in such profusion as to leave no possible doubt that it is truly indigenous. It is noteworthy that Manipur occurs in the very latitude to which many authors fix the possible Chinese wild home of the plant. It is, perhaps desirable,

hills, and through Manipur to the mountains of Burma and again south

Shan Wet
Tea
247
(Conf with
251)

decoction but is eaten as a preserve with other articles of food. The Western Tibetans boil tea with flour and butter and eat the mixture like a pudding a habit somewhat similar to that followed by the Shans and Burmans of eating the leaves. The Shan wet tea from almost records of this fact

Yunnan Tea.
248

as reported by Colonel Hannay on Bhanso and on the capacity of the Shan Countries (dated January 1836, but reprinted in *Sel Rec, Beng Govt*, XXV, 1857). Various early accounts also exist of a trade in tea between Assam and Burma with Yunnan, so that there seems little doubt the true tea plant is now, and

limited as the known distribution of the tea plant except at the extreme south eastern corner or in regions more or less adjacent to Manipur. It would thus appear that DeCandolle's opinion as to the home of the tea plant being the mountainous region which separates the plains of India from those of China is strictly speaking too extended. The plant in a truly wild condition occurs only in a small portion of the extreme easterly division of that mountainous tract and further, as already remarked as far as we have any direct evidence to bear on the question,

Far away to the east,
Manipur, in South
ur We know very
mountainous and agri-
cultural travellers have

The Tea plant.

CAMELLIA
theifera.

reported tea as being found in an irregular state of cultivation (Trav. Pioneer of Commerce, page 171), speaking of the Ya-tzow (or Ya-chau) says, "The tree from which this peculiar kind of tea is chiefly along the banks of the Ya-ho, and produces the tea exported to Europe, is a tall tree with a large coarse leaf." This is very much a description of the so-called indigenous Assam tea plant, but it recalls also in some respects the late unfortunate Captain Gills description (River of the Golden Sand of) of Western China, but

Cooper

TEA.

from the tea of other parts of Tibet, be actually made

Brick Tea of
Western
China.
250

nese and Japanese tea cultivation thus extends from 20° to 21° North latitude. It is frequently found growing in regions but severe snowy winter, a fact which seems to Royle and the other earlier advisers of the

Region of
Chinese Tea

Mountains which separate the 24° and 25° the north east

Region of
Indian Tea
Cultivation.

India it is
grown on the
of Central
North latitude
23° and 32°

The other species of Indian Camellias occur approximately along the same region as has been indicated for *C. dropifera*, only that they are much less abundant and are met with in

The writer feels
and Chinese advice
to view it as intro-
duce the suggestion
ground so as to produce the required fermentation
the Shans in Inner

as practised to-day

Drinking
(Conf with
247)
251

requires to be softened by boiling, and hence might have originated

C. 251

CAMELLIA
theifera

The Tea plant.

TEA.

the Tibetan method of eating the tea leaves after they had been boiled in flour and butter. From this one might be pardoned drawing on imagination still further by supposing the enlightened Chinese to have improved the process of manufacture and to have refined the method of cooking by preparing an infusion from the leaves instead of eating them. As partly supporting this theory we have the astonishment expressed by several of the earlier writers that the Chinese only pour boiling water

Smoking Tea.

in Cardamoms
hill tribes who
the sugar used
ster that he has
either eating it
writes to the
smoke in place
as not able for

some time to detect that it was tea and not tobacco that he had been actually smoking

The stirring national migrations of the early inhabitants of Eastern

The Spread of
Tea Cultiva-
tion

252

it may be urged that there are references to tea in Chinese botanical works (or to what appears to be tea) at a date prior to any known migrations from Burma to China or from China to Burma or Siam. But in none of the very early supposed references to tea is mention made of eating the leaves as pickle or after being cooked into pudding or of making a beverage from them by means of boiling hot water. May not the tea plant therefore or some allied *Camellia* have been cultivated in

Improvement
of Tea stock.

253

Styles united for about 3rds of their length

In some of the cultivated states, the calyx is described as quite hairy,

CHINA TEA.

254

THE HISTORY OF THE CHINA TEA

There is every reason to believe that, although the habitat of the tea plant may be somewhere on the Assam-Burman and Chinese frontier, the practice of preparing a beverage from its leaves existed for centuries in China before it was known in India. Apparently classical scholars have failed to find any allusion to the plant or to the beverage in the

The Tea-plant.

CAMELLIA
theifera.

TEA.

works of the early Sanskrit, Arabic, and Persian writers. Tradition would seem to point to the plant having come from India to China, but the legend upon which this idea mainly depends is told by the Japanese and seems unknown to the Chinese themselves. In his interesting little work (*On the Study and Value of Chinese Botanical Books*) Dr. Bretschneider says that the plant is alluded to by a writer as early as 2700 B.C., and that a commentator, alluding to this fact, adds (in the 4th century A.D.) that by means of hot water a beverage is obtained from the leaves of the plant.

The Beverage
made in China
in the 4th
Century.

Thus the literature of China allows of little doubt as to the beverage having been known in that country at least since the 4th century, and very possibly from a much earlier date. According to most writers it began to be systematically cultivated in South-Eastern China about that period, and we have a definite reference to the industry in the annals of the T'ang Dynasty, 793 A.D., where allusion is also made to the article having been subjected to an imperial duty. Macpherson (*History of European Commerce with India*) remarks that Soliman, an Arabian

Japan in the
9th Century.

trader had dealings with the Chinese in the beginning of the 14th century, and it is probable they were the first to introduce tea to Europe. This is claimed, however, by some authorities for the Dutch, the article having been first shown in Amsterdam and thence sent to London. The earliest authentic European notice of tea occurs in Ramusio's introduction to

Europe in the
16th Century.

...pany wrote to his friend in Meaco in the year 1615, asking for "a pot of

Tea was in
use in
England
in the 17th
Century.

for a second present to His Majesty is recorded —

"22½ lb of thea at 50s per lb	£ 3 d.
For the two cheefe persons that attend His Majesty, thea	56 17 6
	6 15 6"

Not, however, until the year 1677 did the East India Company take steps to secure a regular and commercial supply of tea. The order the London Directors then issued was "for teas of the best kind to the amount of 100 dollars." This order seems to have been exceeded, and the market accordingly glutted, for we next read of complaints regarding the

Commercial
supply in
1677.

Imports
4,713 lbs.

CAMELLIA
theifera.

The Tea-plant.

TEA.

"Garraway's," and a duty was claimed from the vendor of 8d. a gallon. In *Pepys' Diary*, under date of 28th September 1660, there occurs the entry "I did send for a cup of tea (a China drink) of which I had never drank before." *Indian Terms*, give which mention is

A duty levied,
1689.

as in the time of William and Mary (1689), it was then subjected to a tax of 5s. a pound and 5 per cent on the value of the article *ad valorem*. This is perhaps the heaviest duty to which it has ever been subjected. As a result the

Tea Monopoly.

as 1633

In 1703 the imports into Great Britain amounted to 105,000lb, and the article was sold at 16s. a lb. In 1704, the Chinese, imitating the monopoly granted by the Dutch Company, endeavoured to set up a company, who alone would be permitted to import tea. This company was characterised by a "monster in trade," but a bribe of £1,600 per ship was not, however, to be refused.

Imports
1,000,000lbs.

Macpherson has estimated that this amounted to 200 per cent. on the average price of the article. From 1781 to 1787 the duty was remitted until it fell

Adulteration.

of the 18th century, excessive smuggling. The evils urged by

But the
instructive

In 1745 it was reduced to 30 per cent, with the result that whereas the sales for the five previous years had on an average been 768,520lb and yielded a revenue of £175,222, for the five succeeding years (after the reduction)

The Tea plant.

CAMELLIA
theifera.

they were 2,360,000lb and gave an annual revenue of £318,080. This extremely favourable result, instead of suggesting the advisability of further reduction, seemed to excite only the cupidity of the rulers to obtain from the supposed educated taste of the people a greater revenue. From 1759 to 1784 the duty was steadily raised until it attained the alarming proportion of 119 per cent. on the value of the article. Smuggling and adulteration were of course renewed with greater energy than before. But in 1784 the duty was again reduced to 12½ per cent. For the three

TEA.

The result was that during these 25 years the sales stood stationary at an average of 21,000,000lb and yielded an average revenue of 2½ million pounds sterling. The restriction in the sale of tea thus caused was greatly increased by the fact that the East India Company still retained its charter as the sole importers of tea, but in April 1834 a new state of affairs began to dawn. An Act of Parliament had abolished the East India Company's monopoly, and free trade considerably lowered the initial price of tea. At the same time the *ad valorem* duty was abolished and differential rates established, and all "bohea teas" were subjected to a customs duty of 1s 6d a lb, the better qualities of tea paying 2s 6d to 3s a lb.

Revenue
£2,500,000.Removal of
Tea Monopoly,
1834.

fixed
with
a fall
a poi
prese

The writer has purposely passed over, in their chronological places, the incidents connected with the history of the Indian tea industry, deem-

THE HISTORY OF THE INDIAN TEA INDUSTRY.

Difficulties with China early began to make the British Government realise the danger of having no other source of tea than China. Ultimately the whole energies of the Chinese section of the East India Com-

INDIAN TEA.
255

CAMELLIA
theifera.

The Tea-plant.

TEA.

Tea in
America.Tea seed sent
to India in
1780

pany were concentrated in the tea trade. Friction with the Company soon gave vent to loud outcries in England which were re-echoed by the disaffection of America. Tea in fact became intimately connected with the severance of the American Colony from the Crown of England. Colonists, disguised as Indians, boarded British ships, laden with heavily-taxed tea and threw it over-board, this was one of their first acts of open rebellion. The taxation of tea thus became a serious problem, and in a half-hearted way the East India Company responded to the wish of the Government that efforts should be made to cultivate tea in India. Seed was accordingly

was handed over to Colonel K. small nursery in his garden this garden ultimately became the Royal Botanic Gardens, Seebpore, near Calcutta. Colonel Kyd, one of the founders of horticulture in India, and one of the earliest botanists of whom we have mention, has a fitting memorial in the centre of the Seebpore Gardens. Reporting on his tea experiments he wrote to Sir Joseph Banks pointing out that the neighbourhood of Calcutta did not seem the most suited locality. In reply Sir Joseph, in 1788, addressed Warren Hastings as to the desirability

Discovery of
Tea in India,
1819-1821

Assam or from Manipur is almost immaterial. There seems no doubt whatever that Mr. Scott was the first European to have seen

that species found its way to Dr. Wainch's hands and is now, it would appear, in the Wallichian Herbarium in the Linnean Society's Rooms,

Gold medal
of the Society
of Arts

secure some the matter up, and the good tea was only person who would produce the best sample of Indian or Colonial grown tea. Interest was thus awakened, but years passed before any one claimed the medal. In 1826 the brothers Bruce, inspired by Scott according to some authors, and acting independently according to others, rediscovered the tea plant in Assam, in consequence Mr. C. A. Bruce received the Society's gold medal, he of land for tea culture person of C d in the of the tea discoverer of India th Society clearly proved by Mr. Dutton that Scott was prior to either of these

The Tea-plant.

CAMELLIA
theifera.

TEA.

Operations
commenced.

pioneers, but there seems no doubt whatever that Major (and possibly also Mr.) Bruce, had prior claims to Charlton for being the re-discoverers

A committee was appointed, with Dr. N. Wallich as Secretary, to report on the situations best suited for the experimental cultivation of China tea. Drs. Wallich and Royle went to the appointment by a South Easterly Mr. G. J. every feature of the Chinese cultivation and manufacture of tea, and to bring away plants and seed. That gentleman had scarcely commenced his enquiries when he was recalled by the announcement that the tea plant had been found in Assam. Captain (afterwards General) Francis Jenkins had become Chief Commissioner of Assam, and he went with energy into the Bruces' discovery of tea. Had Mr. Scott's still more early discovery received even a passing consideration, Mr. Gordon would, in all likelihood, never have been deputed to China, and several years would have been saved, and according to many planters the curse of Assam-China tea—would have never found its way there. As it was, Dr. Wallich at first refused to accept General Jenkins' plant, as being the true tea-yielding species, but he appears to have given him the identification of the Assam plant, a commission was appointed in 1836, consisting of Drs. Wallich, McClelland, and Griffith to visit Assam and report on the tea said to be found there. One of the most curious of a wou that tried. Drs. Wallich, Royle, and Falconer continued almost to the last to contend that the Himalayan localities would be preferable, but the claims of Assam were eventually recognised and urged by Drs. McClelland and Griffith.

Tea
Commission
appointed.
1836.

strong advocates for the pure China plant, and the localities situated by them for that plant were certainly preferable to the hotter and damper regions of Assam.

Seed sown
in the
Calcutta

CAMELLIA
theifera.

The Tea-plant.

TEA.
First Assam
Garden,
1835
Indian Tea
sent to Eng-
land, 1838.

In 1835 the first experimental plantation was made at Assam, and in 1838 the first tea was sent to England.

its existence, and its shares fell so low that they could scarcely be sold. About 1852 its prospects began to improve, and with its success the tea

indu

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1853

indu

made between 1835 and 1840 to introduce tea into Southern India, but little interest was taken in the experiments previous to 1865 (Robertson's

Dis. of the Tea Plant, p. 10.

Tea Disaster,
1865-67.

Dis. of the Tea Plant, p. 10.

Dis. of the Tea Plant, p. 10.

Society of Arts. Dr White has shown that the heavy expenditure on cultivation and manufacture has been so effectively reduced (and that it may be even still further lowered) that all fear of competition with China may be said to have been removed. But while this is so many planters hold the opinion that a danger exists in the outcry for reduction, since the point may be thereby reached of defective cultivation. China, once sup-

her highest level. The latest returns show the shipments from China for this year as 30 million pounds below those of the preceding year. Hitherto the attention of the Indian planter has been directed to compete with China in the London market, while all the time the imports into India of cheap Chinese tea have been increasing.

Growth of
Indian Tea
Trade.

The Tea-plant.

CAMELLIA
theifera.

TEA.

The British Government commenced to record separately Indian teas in 1852, but the table has been drawn up from 1864-65 to 1885-86. Briefly, it may be repeated the exports from India were in 1838 declared to be 488lb, while in 1886 they had attained the proportion of 68,784,249lb

YEAR.	1	2	3	4
	Quantity exported to all countries from India in lb	Value of the same in Rs.	Imports into Great Britain of Indian tea (from 1873 including Ceylon) in lb.	Per centage of Indian to China teas consumed in Great Britain.
1864-65	3,457,430	29,02,820	2,510,000	3 to 97
1865-66	2,754,157	27,30,350	5,133,000	4 to 96
1866-67	6,357,680	36,03,268	7,084,400	6 to 94
1867-68	7,811,429	68,69,250	8,132,400	7 to 93
1868-69	11,450,213	95,13,764	10,448,320	10 to 90
1869-70	12,754,022	1,03,78,830	13,148,900	11 to 89
1870-71	13,232,732	1,12,03,167	15,351,600	11 to 89
1871-72	17,187,328	1,45,49,846	16,942,000	13 to 87
1872-73	17,789,911	1,57,76,907	18,424,000	15 to 85
1873-74	19,324,235	1,74,29,256	17,377,900	13 to 87
1874-75	21,137,087	1,93,74,292	25,603,100	16 to 84
1875-76	24,391,599	2,10,64,163	25,603,100	17 to 83
1876-77	27,784,124	2,60,74,251	29,383,700	19 to 81
1877-78	33,457,073	3,04,45,713	31,883,300	23 to 77
1878-79	34,432,573	3,13,84,235	36,007,100	22 to 78
1879-80	38,174,521	3,05,10,200	38,483,700	28 to 72
1880-81	46,413,510	3,05,47,400	45,764,900	30 to 70
1881-82	48,691,725	3,60,91,363	54,080,300	31 to 69
1882-83	57,766,223	3,69,94,665	61,666,300	34 to 66
1883-84	59,911,703	4,08,38,805	65,731,600	37 to 63
1884-85	64,162,055	4,04,47,592	68,159,600	39 to 61
1885-86	68,784,249	4,30,61,335	76,585,000	41 to 59

[Note: The above table is based on the data provided in the original document.]

OIL,
256

quite distinct from the fatty oil.

Camphire, the sweet-smelling Camphire of Solomon, is, according to some authors, the *Henna* of Indian writers; see *Lawsonia alba*, *Lamk*, *LYTHRACEÆ*. Camphire is by other writers a synonym for Camphor.

Bares and Ngai and Perfumery Camphors.

CAMPHOR.

Indian *sai* and a member accordingly of the Natural Order DIPTERO- FORMS OF.

destroyed, being cut up into small splinters in the search for the camphor crystals. It is stated that only about one-tenth part of the trees thus

Camphor are chiefly found in the interior of the stem, often existing in concrete masses, which occupy longitudinal cavities or fissures in the heart of the tree, from a foot to a foot and a half long. More frequently they fill the hollows and interstices within the timber, especially in the knots and swellings formed where branches issue from the stem. The old trees are generally the most productive; an average tree is said to yield 11lb

BLUMEA.
260

the world with camphor. "Wherever trees are cut down this weed springs up, and often to the exclusion of almost everything else," Dr. Dymock has recently drawn attention to a camphoraceous *Blumea* common near Bombay, and used by the country-people to drive away fleas. (See *Blumea*, Vol I, B 539)

Malayan Peninsula and cultivated in many parts of India. There are,

CAMPHOR

History of Camphor.

in addition, a number of other camphors, less intimately related to India, such as **NEROLI CAMPHOR**, prepared from the flowers of the bitter orange, **BERGAMOT CAMPHOR**, **BARISA CAMPHOR**, **SASSAFRAS CAMPHOR**, and **ORRIS CAMPHOR**.

In India, in addition to the species of *Blumea* above enumerated as yielding Ngai Camphor, there are many plants which smell strongly of camphor, some of which would most probably be found to yield that sub-

HISTORY.

262

History of Camphor—Having now very briefly discussed the sources of the various kinds of Camphor, it may not be out of place to say something here of the history of that substance. The authors of the *Pharmacographia* inform us that there is no evidence that Camphor was known to Europe during the classical period of Greece and Rome. The first mention of the substance "occurs in one of the most ancient monuments of the Arabic language, the poems of Imru-*u*-Kais, a prince of the Kindah

description that by the term *apakva karpura*, was probably meant the

Trade Returns and Commercial History.

CAMPHOR.

Camphor obtained from Borneo from the trunk of *Dryobalanops* *aromatica*, and by sublimation from *Med*, 222). Dr. accepts this opinion the Sanskrit writer modern Camphor

HISTORY.

the Sanskrit writers, and Camphor referred to may be which at the period India or imported from appear to have been sufficient the strongly camphoraceous in the first plant resorted to as a substitute or adulterant for the prized Camphor of Sumatra. As a matter of fact, this Camphor is much more nearly related to the Malayan than to the China Camphor, and even at the present day it is ten times the price of the Formosa Camphor, and is extensively consumed in China, partly as a medicine and partly in perfuming the finer qualities of Chinese ink. Moodeen Sheriff mentions four kinds of Camphor as met with in the bazars of South India, viz., (a) *Kāfūre-gaisūrī*, (b) *Sūrati kāfūr*, (c) *Chini-kāfūr*, and (d) *Batāi-kāfūr*.

TRADE RETURNS AND COMMERCIAL HISTORY.

Commerce.—While some of the less important camphors do, to a limited extent, reach Europe and India, the commercial or Chinese form is that which has been called "Common Camphor." This arrives at the English and Indian markets chiefly in a crude state, and is in both countries resublimed. The latter Camphor

TRADE.
263

than the Formosa Camphor.

small
uses,

view
the

chiefly from China, is worth not more than R40 to R65 per cwt. This enormous difference is accounted for by the reputation (scarcely merited) which the Bhimsaini kind enjoys of peculiar excellence" (*Para*, 16, *pages 9 and 10*).

Of Borneo and Sumatra Camphor probably not more than 2 or 3 cwt. are annually imported into India.

CAMPHOR.

Trade Returns and Commercial History.

INDIAN
TRADE IN
CAMPHOR

The Import and Re-export trade in Camphor between India and foreign countries for the past seven years was as follows —

YEAR	VALUE OF CAMPHOR			
	IMPORTED INTO INDIA		RE EXPORTED FROM INDIA	
	Bhimsani or Barus	Other kinds	Bhimsani or Barus	Other kinds
	R	R	R	R
1879-80	20,909	5,34,001	2,316	23,174
1880-81	22,924	5,53,732	140	26,559
1881-82	38,574	5,52,335	1,640	21,138
1882-83	43,618	8,68,794	529	25,231
1883-84	38,579	6,27,278	790	28,730
1884-85	35,501	6,53,333	270	13,432
1885-86	25,944	6,53,545	Nil	16,779

YEAR,	VALUE	ANALYSIS OF EXPORTS FOR 1885-86	
		Country to which exported	Province from which exported
	R		
1879-80	7,514		
1880-81	7,142		
1881-82	6,510		
1882-83	9,475		
1883-84	6,682		
1884-85	6,135		
1885-86	6,055		
		Ceylon	Bombay
		Other Countries	Madras
		TOTAL	TOTAL

Indian
Refined
264

the process as practised in Bombay "The process of resublimation is a peculiar one, the object being to get as much interstitial water as possible into the camphor cake. The vessel used is a tinued cylindrical copper drum, one end of which is removable; into this is put 14 parts of crude camphor and 2½ parts of water, the cover is then luted with clay, and the drum, being placed upon a small furnace made of clay, is also luted to the top of the furnace. In Bombay four of these furnaces are

Purification of Camphor.

CAMPHOR.

Ind., 1st Ed., 549). This same practice seems to be followed at Delhi and at a few other cities in India, but the method is crude and unsatisfactory, when the purified article is compared with that imported into India from Europe. The European process of refining camphor was long kept a secret, and towards the end of the seventeenth century the entire camphor of Europe had to be sent to Holland to be sublimed. A monopoly was also held for some time in Venice, but at the present day camphor-refining is largely accomplished in England, Holland, Hamburg, Paris, New York, and Philadelphia.

European
Refined,
265

by means of a fire, where flame might ignite the gas given off during the process of sublimation, dishes of fusible metal, kept warm by a furnace below the room, are used. The heat is suddenly raised from 120° to 190° C, and kept at that point for half an hour, so as to expel the water from the camphor. The temperature is then raised to 204° C, and maintained at that point for 24 hours. When the crude camphor has melted, the sand

The *rationale* of the process consists in preserving the temperature uniformly at the point of volatilization; the quicklime retains resin or empyreumatic oil, the iron fixes on any sulphur that may be present,

Camphor
Plants,
266

India. In the report of the 12-83 it is mentioned that a re well. It seems likely that, rupees worth of China Camphor, since there is every reason were made, the tree could be

successfully introduced the amount of Camphor consumed in

CAMPHOR.

Chemical Formula for Camphor.

India is not sufficiently great to tempt experiments being undertaken with *Dryobalanops Camphora*, but the extended cultivation and manufacture of *Blumea* and *China Camphors* would seem highly desirable.

CAMPHOR OIL.

OIL
267

Oil of Camphor—There are two very distinct substances known by that name in commerce. The first and most important is the oleo-resin or camphor oil of Borneo. This is obtained by tapping the trees. Some times this accumulates to such an extent that (as with the South American *copaiba* tree) the trunk, no more able to resist the pressure of the fluid, spontaneously bursts open or has its tissue broken into large internal chambers, producing while this occurs a loud noise, "as if the tree were rent in twain." The *Pharmacographia* states that Motley, in cutting

distinct and should not be
phor-oil of Formosa. This
is a brown liquid, holding in solution an abundance of common camphor,

CHEMICAL AND MEDICAL PROPERTIES OF CAMPHOR

268

Chemistry—It is not necessary to enter into this subject in great detail. For a full account of the chemistry of Camphor the reader is referred to works on chemistry, but more particularly to the *Pharmacographia* and the *United States Dispensatory*, as these are more likely to be accessible than the numerous and scattered papers in which this subject

camphor. When mixed with resins or concrete oils, camphor often partially or completely loses its odour. The formula given for this form of camphor is $C_{10}H_{16}O$, by treatment with various reagents it yields a number of interesting products. Prolonged boiling with nitric acid oxidises the camphor into *Camphoric acid*, $C_{10}H_{14}O_4$ and *Camphoronic acid*, $C_8H_8O_4$, water and carbonic acid being eliminated. When repeatedly distilled with chloride of zinc, it is converted into *Cymene* or *Cymol*, $C_{10}H_{16}$.

$C_{10}H_{16}O$. It is somewhat does not consequently it. It is also heavier, having the sp gr 1.009. It is easily pulverised without the aid of alcohol, it is, in fact, a more compact and brittle substance than ordinary

CAMPHOR

Medical Properties of Camphor.

MEDICINE

medicine is more generally useful than camphor in doses of 4 grains

pill twice or three times a day, according to the severity of the symptoms, will sometimes afford great relief. In each of these cases it is important to keep the bowels freely open.

"In painful affections of the uterus, camphor in 6 or 8-grain doses often affords much relief. The liniment should at the same time be well

rest of over the region of the heart. It should be discontinued if it causes headache or increased heat of the scalp. Its use requires much discrimination and caution.

"To prevent bed sores, it is advisable to make a strong solution of camphor in alcohol or brandy and to bathe the sores with it. It is also likely to

process of

Assistant Surgeon Jaswant Rai, Multan). "It is an irritant and rubefacient, good for a cold in the head with coryza, summer diarrhoea" (Brigade Surgeon W. R. Rice, Jubbulpore). "Largely used as a liniment for muscular pains. Is a good expectorant" (Surgeon R. Gray, Lahore). "Used in 3 or 4-grain doses and mixed with about $\frac{1}{4}$ grain of extract of belladonna. I have found this to be of very great value in neuralgic pains."

Ilang-ilang.

CANANGA
odorata.

MEDICINE.

preserves clothing and other articles against insects and worms" (Surgeon Shub Chunder Bhuttacharji, Chanda, Central Provinces) "Useful in cholera" (Surgeon H. D. Masani, Karachi). "In the form of spirit, camphor is very effective in cholera passages. In the case of cholera its use, and think it is a good remedy" (Surgeon S. H. Browne). "that when given in 10-grain doses every fourth hour in cholera, good results are obtained."

Assistant Chuna Lal, Jubbulpore) "Is taken in large doses to procure abortion" (Surgeon-Major D. R. Thompson, Madras) "Camphor is daily used as a stimulant, antispasmodic, sedative to the genito-urinary system, and parasiticide. The spirit of camphor is a useful remedy in cholera, in 1 to 5-drop doses" (Assistant Surgeon Nundo Lal Ghose, Bankipur) "Camphor Used in 3 or 4-grain doses and mixed with about $\frac{1}{2}$ grain of extract of belladonna. I have found this to be of very great service in cholera."

DOMESTIC
270

but it is a comparatively cheap remedy to enable them to take root when placed in the soil

Camphora glandulifera, Nees, see Cinnamomum glanduliferum, Meissn.; LAURINÆ.

Canada Balsam, see Abies balsamea, Aston.; CONIFERÆ.

CANANGA, Rumph.; Gen Pl, I, 24.

Cananga odorata, H. f. & T. T., Fl Br. Ind., I, 56; ANONACEÆ

271

THE ILANG-ILANG of European perfumers.

Syn.—UVARIA ODORATA, Lamb

Vern.—"Ilang-ilang" (H. f. & T. T.)

Refere

371

Encyclopædia of the History of the

CANARIUM
commune.

Java Almond.

JLANG-
JLANGOIL.
272

Habitat.—A large evergreen tree of Burma (Ava and Tenasserim), distributed to Java and the Philippines. Cultivated in many parts of

CANARIUM, Linn.; Gen Pl, I., 324

273

Canarium bengalense, Roxb; Fl Br Ind, I, 534; BURSERACEAE

Vern.—Gogul dhuṣ, NEPAL, Narockpa, LEPCHA, Tekreng, GARO; Bis-jang, dhuna, ASS

References.—Kurs, For Fl Burma, I, Hort Sub Cal, 149, Him Bot, 177, Cooke,

GUM.
274

Habitat.—A tall tree, with a straight cylindrical stem, it is met with in the eastern moist zone, eastern Himalaya, Bengal, and Burma

Gum.—Yields a brittle, amber-coloured resin, resembling copal, which is used as incense. The natives set little value on it. In Calcutta bazars

TIMBER
275MEDICINE.
276

swellings

FOOD

Food —“Fruit edible

277

Structure of the Wood —“Strong and durable, used for common house building” (Trimen).

TIMBER.

278

C. commune, Linn; Fl Br Ind, I, 531.

JAVA ALMOND TREE.

Vern.—Jangali badam, HIND, Jangali beldana, CUTCH, Kagli mara, kagga libiya, Java badamiyann, KAN, Canari, MALA, Rata kakana, SING.

References.—Roxb, Fl Ind, Ed C B C, 504, Vingt, Hort Sub Cal.

GUM.
280

intr

long

Phc.

as

C. 280

Bengal Incense: Elmi.

CANARIUM
commune.

Blanco, a botanist of Manila, described in 1845 under the name *Icica Abilo*, but which is completely unknown to the botanists of Europe. Blanco's description is such that

in either of the old genera *Icica* or
and Hooker in that of *Bursera*,
in fact, even the order to which it belongs is somewhat doubtful.

"Manilla Elemi is a soft, resinous substance, of granular consistence
more
enders
impuri-
yellow

Manilla Elem.
281

tint. It has a strong and pleasant
yet withal somewhat terebinthine

higher temperature fuses into a clear

(15th Ed), page 536, says "The
Manilla Elemi is conjecturally referred to *Canarium commune*." In their
Medicinal Plants Bentley and Trimen give a detailed description of
the plant. They say "It is also cultivated in India, and has been grown

by Blanco, should be even referred to the *BURSERACEÆ*.

The gum is used principally in the manufacture of varnishes, also in
felting and in medicine.

Oil—The nut yields a semi-solid oil on expression, similar in appear-
ance to coconut oil. It is used for culinary purposes, and is regarded
palatable.

OIL.
282

§
tine
to pc
C. f.

Bombay)

FOOD.
284

Celebes If eaten fresh or too frequently, the nuts often produce diar-
rhœa (*Drury*).

CANARIUM
strictum

Black Dammar Tree

285

Canarium strictum, Roxb, Fl Br Ind, I, 534, Beddome, t 128

THE BLACK DAMMAR TREE

Vern

Reference

GUM
286

Habitat —A tall tree of South India. Common about Courtallum in the Tinnevely district and in Kanara.

Gum —It yields a brilliant resin called the Black Dammar of South

ten years between the months of April and November, and the resin is collected in January

This substance occurs in stalactitic masses of a bright shining colour when viewed *en masse* but translucent and of a deep reddish brown colour when held between the eye and the light, homogeneous with a vitreous fracture, partially soluble in boiling alcohol, and completely so in oil of turpentine (*Pharm Ind*)

BLACK
DAMMAR
287

the manufacture of bottling wax varnishes, &c. Its colour when in solution is pale if compared with its dark tint when in mass. Thus, though insoluble in spirit, its solution in turpentine forms a tolerable varnish. When submitted to destructive distillation it yields about 78 per cent of oil, resembling that obtained from common colophony, but I fear, in the majority of its possible applications, it possesses few advantages over

es the
nearly
suit
nmon
with
t and

colourless as glass, in such amount that a single firm turns out 60 tons per week

MEDICINE
Burgundy
Pitch
288

Medicinal —The resin is used medicinally, according to Dr Bidie, as a substitute for Burgundy Pitch in making plasters

Special Opinions —§ 'Bathing in a tub painted inside with dammar is supposed to relieve the irritation of prickly heat' (*Surgeon Major A S G Jayakir, Muskat Arabia*) 'Employed as a liniment with gingelly oil, in rheumatic pains' (*Surgeon Major F F L Ratton, Salem*)

C. 288

The Sword bean.

CANAVALLIA
ensiformisCANAVALLIA, *Adans* (PDC); *Gen Pl*, I, 537Canavalia ensiformis, DC; *Fl Br. Ind.*, II, 195; *Wight, Ic*, I, 753; LEGUMINOSÆ.

289

SWORD BEAN Sometimes called PATAGONIAN BEAN.

Syn — C. GLADIATA, DC, DOLICHOS GLADIATUS, Willd., as in Roxb, *Fl. Ind.*, Ed C B C., 559, D ENSIFORMIS LinnVern — *Makham shim, melhun*, BENG, *Tihon*, SANTAL, *Sufed or Idl kud jumbal*, HIND, *Sem, Pa & N-W P*, *Gavari*, MAR, *Gavara*, BOM.References — *Thwaites, En Ceylon Pl*, 88 *Dals & Gibs, Bomb Fl*, C. B. C. 559

p 144 fig 27

stitious belief that it will protect their property from plunder (*Smith*)There are several forms of this plant met with in India, the seeds and flowers being of different colours (*Drury*) These according to the *Flora of British India*, are referred to three distinct varieties —

Var 1st, viroza, *W & A, Prod*, 253, *Dals & Gibs, Bomb Fl*, 69, *Dolichos viroza*, *Roxb, Fl Ind*, Ed C B C., 559 Pods often 2-4 inches long, 4-6-seeded Speaking of this form, Roxburgh says 'I do not find that any part of this species is in any shape useful to the natives or others, indeed, the natives of Coromandel, where the plant is common, reckon it poisonous, which is corroborated by Van Rheede' This is known in Bengal as *Kath-shim*, or *Kala-shim* and *Gavara* (*Gowara*) in Bombay

290

Var 2nd, turgida, *Grah in Wall Cat* C *Stocksit, Dals & Gibs, Bomb Fl*, 69 Pods large and turgid, 3 to 5 inches by 1½ to 2 inches

291

Var 3rd, mollis *Wall* Found in Southern and Western India The pods are smaller than in either of the above, when cultivated they are tender and eaten like French beans.

292

Food — The young, tender, half grown pods, apparently of only var 3 are actually eaten, but these constitute the so-called French beans at the tables of Europeans Natives also eat them in curry The form with large white seeds is considered the most wholesome Some five varieties are reported to be cultivated in Lucknow, of which the form known as *hulwa*, a white narrow-podded variety, is considered the best Mr Cameron informs the writer that the seeds of this pulse are highly relished in Mysor Atkinson writes of the North-West Provinces that the *sem* is "consumed by all classes"

FOOD

293

Professor Church gives the analysis of this pulse (p 144), and adds that its nutrient ratio is 1 2 2 and the nutrient value 80

H

C. 293

CANES

White Cinnamon, Canes

294

Canavalia obtusifolia, DC, Fl Br Ind, II, 196References — *Thwaites En, Ceylon Pl*, 88, *Voigt, Hort Sub Cal*, 235, *Drury, Us Pl* 105, *Balfour, Cyclop*, *Kew Cat*, 44

Habitat — Met with on the coasts of the Western Peninsula, Ceylon, and the Malaya Peninsula

"Is a useful binder of loose sand" (*Balfour*)

295

CANELLA, Sw, Gen Pl, I, 121, 970**Canella alba, Murray, DC Prod, I, 563; CANELLACEÆ**

WHITE CINNAMON Eng, CANELLE BLANCHE, Fr, WEISSER ZIMMET, Germ CANELLA BIANCA, It CANELLA ALBA, Sp CANELLA BLANCA Sp

References — *Logi Hort Sub Cal* 88, *Pharm Ind*, 25, *Fluck & Hand, Pharmacog* 73 *U S Dispens*, 15th Ed, 337, *Year Book of Pharmacy* 1873 p 43 *Spons Encyclop* 1419 *Smith Dic*, 84, *Treasury of Botany Hanbury Sc Papers*, 353 *Kew Cat* 14

Habitat — A West Indian aromatic plant, the bark of which is imported into India, and is sold by druggists, the tree might be cultivated in India

OIL

296

Oil — "An essential oil, erroneously called 'white cinnamon,' is obtained by the aqueous distillation of the bark, it is a mixture of caryophyllie (engenic) acid, an oil resembling cajuput, and an oxygenised oil" (*Spons, Encyclop*) It is a rare article, not known to commerce

MEDICINE

Bark

297

Medicine — The bark is met with in rolls or quills two or three feet in length, having a bitterish acid peppery taste The odour is something like a mixture of cloves and cinnamon The bark is an aromatic stimulant used to a limited extent in combination with other articles in constitutional debility, dyspepsia scurvy, &c (*Pharm Ind*) In the West Indies it is used as a condiment and has some reputation as an antiscorbutic

CANES.

CANES

298

Canes

CANNE, Fr, ROHR Germ, Bhate HIND, Nathur, GuzThe species of the genus *Calamus* — a genus of climbing palms — yields the canes of commerce Few plants are more useful to the hill tribes of India and the Malay than are the various forms of cane yet very little of a definite nature is known as to the peculiar properties and uses of the individual species They afford 'Dragon's blood' and the "Malacca" and "Rattan Canes" of commerce but it is probable that each of these articles is obtained from more than one species of *Calamus* Reeds and small bamboos are sometimes, but incorrectly, spoken of as canes

The sp-

delicate gr

stunted or

times, by

trees of the forest, they ascend as gigantic climbers, often attaining to as much as 600 feet in length The stems, leaves, and tendrils are covered with spines and prickles The fruit hangs in great clusters, the inner

Canes often
600 feet long

C. 298

Asiatic Uses of Canes.

CANES.

pieces. The roots and young sprouts are eaten as vegetables and somewhat resemble asparagus. Canes owe their value to their great strength, and more particularly to the strength of the outer layer of woody structure. As substitutes for ropes they are invaluable, and in some respects even superior to ordinary ropes. For walking sticks and canes, and for spear and lance shafts, they are in great demand and are justly popular, lightness, strength, and uniform structure and size, are properties of the greatest importance.

Substitutes
for Ropes
290
Shafts.
300

And-bridges
301

parallel canes forming the pathway, the canes being knut together with bamboo or bark, so as to constitute a band not more than 18 inches in breadth, through which the rushing water may be seen below. The railing affords additional support, it consists of two canes carried about three or four feet above the pathway, one on either side. These are here and there connected by perpendicular canes passing under the pathway, and the whole structure is bound together by a network of bark-ropes or smaller canes. With the weight of the traveller the bridge bends until it is often alarmingly near the water, and to prevent the railing closing on the person crossing the bridge, barriers are thrown across here and there, about 18 inches above the pathway, similar stays are also carried over head. These barriers constitute the chief difficulty in crossing a cane bridge, for on raising the foot, the swaying structure and the rushing

Bridges.

Ropes

and indeed throughout the Eastern Islands, vessels are furnished with cables formed of cane twisted or platted. This sort of cable was formerly extensively manufactured at Malacca (Royle, *Fibrous Plants*). Dampier says "Here we made two new cables of rattans, each of them four inches about. Our captain bought the rattans, and hired a Chinese to

them down, nor can we carry them out but by placing two or three boats at some distance asunder, to buoy up the cable while the long boat rows

CANES.

European Uses of Canes.

entire and cut Useful chairs, sofas, and couches are made all over India from cane, and cane *punkha* ropes are almost in universal use. In Beugal baskets (*dhama*) are made of entire canes by twisting the canes round

gether, by means of cane-strings, the canes being arranged so as to be flat and parallel.

THE EUROPEAN USES OF CANES

They are valued on account

They are extensively used as

as a substitute for whalebone

such ribs costing only from 1d to 2½d instead of 2s 6d to 3s for whalebone,

Cane is also extensively employed in saddlery and harness, and a wicker-work of rattan is now used in the construction of the German military helmet

of the central core In Europe this central portion is saved, a patented machine being used to split the rattans which cuts off the outer layer in bands of any required size or thickness, while leaving the central core in the form of a perfectly round and even rod This rod is utilised in the

to level, of the fact that the Nagas and other hill tribes of Assam dye human and goats hair a beautiful scarlet, as also tint with the same colour the outer silicious layer of the rattan cane Bands of stained rattan they use for decorating ear rings, bracelets, and leggings

Prepared strips of rattan are extensively used in Europe as in India for caning furniture, but a comparatively new and increasing trade in rattan is the construction of baskets, which are rapidly displacing willow baskets; these are used in cotton-mills, sugar refineries, and other factories, as well as employed extensively by Railway Companies and by gardeners, &c Rattan baskets are peculiarly adapted for carrying carboys containing acids, since the silica of the cane is not acted on by acids (*Spons, Encyclop*) The waste product, after stripping the cane, is, by certain manufactures, reduced to a fibre, and in this form is largely used for stuffing mattresses Cane mattresses are in great favour on the Continent, taking the place of the cor of India

TRADE RETURNS OF CANES

Very little can be learned regarding the internal trade in rattan canes; but, from the fact of the imports (which come chiefly from the Straits Settlements) into Calcutta, Madras, Burma, and Bombay, far exceeding the exports, it seems that with improved facilities of communication a trade might easily be opened up with Eastern Bengal, Assam, and Burma which would to a large extent check the importation, from foreign countries, of a product of which India has herself an unlimited amount The following

Trade Returns

CANES

summary of the foreign trade in Canes and Rattans will be found instructive —

TRADE

Foreign Trade in Canes and Rattans

YEAR.	IMPORTS		EXPORTS AND RE-EXPORTS	
	Quantity	Value	Quantity	Value
	Cwt	R	Cwt	R
1879-80	206.7	1 93 035	7 433	73 582
1880-81	2 164	1 99 557	16 346	1 6 363
1881-82	29 559	2 92 754	23 801	2 06 544
1882-83	24 603	2 46 476	14 244	1 33 061
1883-84	28 83	2 51 203	20 836	34 884
1884-85	33 408	3 0 675	14 33	1 33 734
1885-86	1 3	1 77 536	6 453	56 844

Detail of Imports 1885-86

Province into which imported	Quantity	Value	Country whence imported	Quantity	Value
	Cwt	R		Cwt	R
Bengal	7.94	66.98	Sam	4.3	3.58
Bombay and Snd	9.871	79.095	Straits Settlements	20,350	1 72 880
Madras	62	87.3	Other Countries	450	498
British Burma	2.986	23.530			
TOTAL	21 2.3	77 536	TOTAL	2 2.3	77 536

Detail of Exports 1885-86

Province from which exported	Quantity	Value	Country to which exported	Quantity	Value
	Cwt	R		Cwt	R
Bengal	1 5.5	20 770	United Kingdom	3 827	35 030
Bombay	623	2 406	United States	427	8 435
Madras	637	54	Italy	63	60
British Burma	3 700	3 354	Cape Colony	459	6 28
			Mauritius	87	680
			Other Countries	1 5.2	50
TOTAL	20 836	34 884	TOTAL	6 485	56 844

The reader is referred for further particulars to the format on given

Substitutes
for canes
317
Whan-ee
canes
318

CANES

European Uses of Canes.

out the anchor" Ropes are regularly made in China by splitting the

Baskets

302

Chairs

303

Mats

304

Cane work

305

Walking

Sticks

306

Umbrella

handles

307

Umbrella ribs

308

Saddlery

309

Harness

310

Furniture

311

Central axis

312

Window

blinds

313

Dyed cane

314

chairs made in this way being light and cool. A strong and durable floor mat for office purposes is constructed of small entire rattans, bound together, by means of cane-strings, the canes being arranged so as to be flat and parallel.

THE EUROPEAN USES OF CANES

They are valued on account

They are extensively used as

whalebone.

and a wicker-

nan military

helmet, which is said to make it sword proof. But the chief purpose to which cane is put in Europe is in furniture and basket making. In India, canes are cut up by hand, the outer strips being separated at the expense of the central core. In Europe this central portion is saved, a patented machine being used to cut the canes into strips of uniform width.

bands of any

the form of a

construction of

perly not possessed by the strong outer bands, namely that it takes with ease any desired colour. European authorities do not appear to be aware, however, of the fact that the Nagas and other hill tribes of Assam dye human and goats hair a beautiful scarlet, as also tint with the same colour the outer silicious layer of the rattan cane. Bands of stained

Fibre from

cane

315

Cane-

mattresses

316

these are used in cotton-mills sugar refineries, and other factories, as well as by the Indian companies and by gardeners,

carrying carboys containing

acted on by acids (Spon-

manufactures, reduced to a fibre, and in this form is largely used for stuffing mattresses. Cane mattresses are in great favour on the Continent, taking the place of the corr of India.

TRADE RETURNS OF CANES

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CANES

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Detail of Imports 1885-86

Province to which imported	Quantity	Value	Country whence imported	Quantity	Value
	Cwt	R		Cwt	R
Bengal	7 94	66 98	Sumatra	4 3	3 38
Bombay and Sind	9 87	79 092	Straits Settlements	20 350	1 72 860
Madras	62	8 7 3	Other Countries	4 0	498
British Burma	2 986	23 530			
TOTAL	21 213	77 536	TOTAL	23	1 77 536

Detail of Exports 1885-86

Province from which exported	Quantity	Value	Country to which exported	Quantity	Value
	Cwt	R		Cwt	R
Bengal	1 525	20 770	United Kingdom	3 827	35 030
Bombay	6 3	406	United States	427	8 435
Madras	637	54	Italy	63	60
British Burma	3 700	32 354	Cape Colony	469	6 28
			Mauritius	87	680
			Other Countries	1 52	5 0
TOTAL	20 836	34 884	TOTAL	6 485	56 844

The reader is referred for further particulars to the information given under the species of Calamus. In concluding this account of Canes it is necessary to briefly mention a few of the more common articles sometimes sold though incorrectly under the name of cane. The most important is the manila —

comprising returns of grasses

Substitutes for canes
317
Wholesale canes
318

CANES.

European Uses of Canes.

out the anchor" Ropes are regularly made in China by splitting the rattan and twisting it into a rope of any desired thickness. This is used. The small entire and cut

Baskets.

302

Chairs.

303

Mats

304

Cane-work.

305

Walking

Sticks

306

Umbrella

handles

307

Umbrella ribs

308

Saddlery.

309

Harness.

310

Furniture.

311

Central axis

312

Window

blinds

313

Dyed cane

314

Fibre from

cane

315

Cane-

mattresses.

316

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THE EUROPEAN USES OF CANES are even more varied than the Asiatic. They are valued on account of their lightness, flexibility, and strength. They are extensively used as walking-sticks, umbrella handles, and even as a substitute for whalebone for umbrella and parasol ribs, each set of such ribs costing only from 1d to 2½d instead of 2s 6d. to 3s for whalebone. Cane is also extensively employed in saddlery and harness, and a wicker-work of rattan is now used in the construction of the German military helmet, which is said to make it sword proof. But the chief purpose to

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the place of the cor of India

TRADE RETURNS OF CANES

Very little can be learned regard the internal trade - not so much;

Indian Hemp.

CANNABIS
sativa.

CANNABIS, *Linn.*: *Gen. Pl.*, III, 357.

331

Cannabis sativa, Linn ; DC. Prodr., XVI, I, 30; URTICACEÆ.

HEMP; INDIAN HEMP; CHANVRE, *Fr.*; HANF, *Germ.*; CANAPE, *It.*; KANAPLI, *Rus.*; CANAMO, *Sp.*; HAMP, *Dan.*; KANAS, *Keltic*; CANNABIS, *Latin and Greek.*

Syn —C INDICA, *Lamk.*

v.

References.—*DC Prod*, XVI, p 1, 30, published in 1869, Roxb., Fl

Habitat—*Cannabis indica* has been reduced to *C. sativa*—the Indian plant being viewed as but an Asiatic condition of that species. This extends the region of the hemp-plant very considerably. It has been found

CANNA
indica.

Indian Shot

Palm walking
sticks.

319

Male bamboo

320

palm, and from the cocoa-nut palm, and are now-a-days largely used for umbrella handles. The "Malacca cane" is obtained from *Calamus Scipionum*, and the rattan from *C. Ratong* and one or two allied species, the former obtains its beautiful colour by being smoked.

321

CANNA, *Linn*, *Gen Pl*, III, 654Canna indica, *Linn*, *Roxb*, *Fl Ind*, *Ed C B C*, 1, SCITAMINEÆ

INDIAN SHOT

Vern.—*Sabba jaya*, *Hind*, *Kiwara*, N.W P, *Sarba jaya* *lal sarbo**Butsarana*, *SING*

References—*Thwaites En Ceylon Pl*, 120, *Dals & Gibs*, *Bom Fl Suppl*, 60, 634, *C Powell*, *Smith*,

Habitat—Several varieties are common all over India and Ceylon, chiefly in gardens, where they are grown as ornamental and flowering plants, they are in flower all the year.

Dye—"The SEED is black, and round like a pea and yields a beautiful but evanescent purple dye" (*Dals & Gibs*, *Bomb Fl*)

Medicine—The ROOT is used as a diaphoretic and diuretic in fevers and dropsy (*Atkinson*), and also given as a demulcent (*Irvine*). It is considered acrid and stimulant (*Fleming*). When cattle have eaten

DYE

Seed.

322

MEDICINE

Root

323

Seed.

324

FOOD

Root

325

Starch

326

Allment or
arrow-root

327

The starch substances

"In the West Indies arrow-root has been obtained from *C. glauca*, called 'Tous les mois' (*O'Shaughnessy*)" (*Surgeon C & H Warden*, *Professor of Chem*).

DOMESTIC.

Leaves.

328

Seeds.

329

Necklaces

330

use.

sew

necklaces and other ornaments of them. In the West Indies the leaves are used to thatch houses" (*Drury*). [See also under *Beads*, Vol I—*Ed*] "In Bangalore, the leaves are used by the natives in lieu of plates, to serve ragi pudding and other dishes" (*J Cameron, Esq*)

C. 330

Indian Hemp.

CANNABIS
sativa.

CANNABIS, Linn ; Gen. Pl, III, 357.

331

Cannabis sativa, Linn ; DC. Prodr, XVI, I, 30; URTICACEÆ.

HEMP; INDIAN HEMP; CHANVRE, Fr. ; HANF, Germ ; CANAPE,
It ; KANAFI, Rus. ; CANAMO, Sp ; HAMP, Dan. ; KANAS,
Keltic. ; CANNABIS, Latin and Greek.

Syn — C INDICA, Lamk.

Var — C

BURM , Vatikansa, ganja gaha, kansa-gahá, SING.

The above vernacular names are either given to the plant or to the forms of the narcotic. It has been found impossible to separate them for certain, and they have accordingly been left for the present in what must be admitted an unsatisfactory form. Much apparent confusion exists in the various provincial forms of the same word. In the Godavery District the fibre is said to be cultivated under the name *Zanum*.

References — DC Prodr XVI, I, 30 ;

Art, and Manufactures; Hanbury, Sc Papers, 187; Kew, Official Guide, Mus, No 1, p 120, Morris, Godavery Dist, p 69 All Government Excise and other Reports down to 1884-85

Habitat — Cannabis indica has been reduced to C. sativa—the Indian plant being viewed as but an Asiatic condition of that species. This extends the region of the hemp-plant very considerably. It has been found

CANNABIS
satiya

The History of the Indian Hemp

Hemp
Acclimatised
and
Cultivated
in
India.

doubtful of its being a native of Southern and Central Russia, but sus-

springing up spontaneously on the *churs* of the Subarnarekhá river and to be wild in the territory of the Mohurbhunge State on the frontier of Midnapur and also in Singbhum. It is cultivated more or less throughout India, either on account of the NARCOTIC derived from (a) the resin, *charas*, (b) the young tops and unfertilised female flowers—*ganja* (or *ganja*), (c) the older leaves and fruit-vessels—*bháng*, or on account of the fibre, HEMP, or the ripe seed from which an OIL is prepared. *Ganja* is de-

property is not developed until the fruits are mature, leaves at this stage, and sometimes the fruits also, afford *bháng*. With *Cannabis indica* differing in so marked a degree according to the climate, soil, and mode of cultivation, it was rightly concluded that its separation from the hemp plant of Europe could not be maintained. We have here, in fact one of the most notable illustrations of the effect of climate in changing the

The History of the Indian Hemp.

CANNABIS
sativa.FORMS OF
HEMP.

chemical processes which take place in the structure and physiological peculiarities of a plant. In most instances, a plant taken by man from one climatic condition to another, either dies quickly, or if it survives, it exists in a sickly condition. A few plants however, such as the potato,

The plant for one or other of these purposes is now extensively cultivated throughout Persia, in India, from the level of the sea in Bengal to the inner Himālaya at an altitude of 10,000 feet, in China; in Arabia, and in Africa, from the extreme south to the north, and on the mountains as well as on the plains, in the north-eastern portions of America and on the table-land of Brazil. It is also to be met with in Northern Russia even as far as Archangel. In England it not unfrequently occurs as a weed, springing up most probably from rejected birdseed.

The modes of cultivation and the nature of the soil required, depend on the purpose for which the plant is cultivated. This subject will accordingly be discussed later on.

HISTORY OF HEMP.

332

THE NARCOTIC

Indian Literature.—“The earliest synonym appears to be *bhāṅga*, which occurs in the Atharva Veda—the last of the four scriptures of the Hindus. It is derived from a root which means ‘to break,’ and is supposed to imply the process of debarkation by which the fibres of the plant were separated from the stem. This would indicate that even at the remote period when the *Veda* in question was written, probably about 3,000 years ago, the use of hemp as a fibre-yielding plant was well known and the knowledge fully utilised. The *Veda*, however, reckons it, along with the *Soma*, as one of the five plants ‘which were liberators of sin,’ and this would imply that its narcotic property was also well known. The word is used in the masculine form with a short final vowel, and not, as in later literature, with a long one. Both the masculine and feminine

probability, the habit of speaking of the narcotic in the masculine form of the name, and of the fibre in the feminine. As a matter of fact, the nar-

CANNABIS
sativa

The History of the Indian Hemp

HISTORY

cotic yielding is the reverse to the popular belief the male or staminate
and female are

and Sanskrit writers were aware of the existence of male and female
flowers centuries before the sexes of plants were realised in Europe

Himalaya

The
Narcotic.
333

Classical Literature of Europe —The ancient SCYTHIANS seem to have
been acquainted with the narcotic properties of the plant as well as with
its fibre HERODOTUS tells us that they excited themselves by 'inhaling
its vapour' "HOMER makes HEPHY administer to TELEMACHUS, in the
house of MENELAUS, a potion prepared from nepenthes, which made him
forget his sorrows This plant had been given to her by a woman of
Egyptian Thebes,
much stress on this
among them since
ing a secret by wh
secret is supposed
(Johnston, *Chemistry of Common Life*, 337)

Mythology
334

Mythological History of the Narcotic —"The notices of hemp in Arabic
and Persian works are much more numerous The oldest work in which
it is noticed is a treatise by Hassan, who states that in the year 638 A.H.,
Sheik Jafer Shirazi, a monk of the order of HAIDER, learned from his
master the history of the discovery of hemp Haider lived in rigid pri

in wine or spirit seems to have been the favourite formula in which Sheik
Haider indulged himself (*Dymock, Mat Med, W Ind, 604*)

A curious story is told in the Hindu mythology about the origin of
this plant "It is said to have been produced in the shape of nectar

excited On the last day of the Durga Pooja, after the idols are thrown into
water, it is customary for the Hindus to see their friends and relatives and
embrace them After the ceremony is over it is incumbent on the owner
of the house to offer his visitors a cup of *bharg* and sweetmeats for tiffin
(lunch) (*U C Dutt's Mat Med Hind, 236*)

C. 334

The History of the Hemp Fibre.

CANNABIS
sativa.

More Recent Historic Facts regarding the Narcotic.—The use of hemp (*bháng*) in India was particularly noticed by García de Orta (1563), and the drug at time to in his *T. East In*. "It calling DeLacy drug in Cole O Shaughnessy in 1829.

HISTORY.

established place in the Pharmacopœia' (*Fluck. & Haub, Pharmacog, 547-48*).

HISTORY OF THE HEMP FIBRE.

The following extract may be here published as giving the most trustworthy facts which can be adduced regarding the history of the fibre. "According to Herodotus (born 484 B C), the Scythians used hemp, but in his time the Greeks were scarcely acquainted with it. Hiero II, King of Syracuse, bought the hemp used for the cordage of his vessels in Gaul, and Lucilius is the earliest Roman writer who speaks of the plant (100 B C). Hebrew books do not mention hemp. It was not used in the fabrics which enveloped the mummies of ancient Egypt. Even at

The Fibre.

335

Canvas,

with *hasish* before performing certain ceremonies or perpetrating inhuman deeds. The word according to some would appear to have been originally

Assassin.

CANNABIS
sativa.

History of the Hemp Narcotic.

great havoc It seems probable that the English form of the word was adopted at the latter date, but that the more Arabic form was known in Europe for some time previous Hemp is alluded to in the "Arabian Nights" under its more ancient Arabic name, *beng*.

CULTIVATION

CULTIVA-
TION.
336

It has already been incidentally remarked that the cultivation of Cannabis sativa in India is naturally referable to two sections: (a) Cultivation with a view to preparing some of the forms of the narcotic, and (b) cultivation on account of the fibre. It has also been stated that the hemp plant has, to a large extent, changed its character under Indian or rather Asiatic cultivation It is very generally admitted, for example, that in the plains, while the narcotic principle is readily developed, the hemp fibre is but very imperfectly formed Let it, however, be distinctly understood that by hemp is here exclusively meant the fibre of Cannabis sativa This remark is all the more necessary when it is added that in the Government report on the Trade and Navigation of the

Expectations
regarding
Hemp Fibre.

a superior oil-seed, and the hemp plant a valued narcotic, but neither

eleva-
Cyclo-
own in

enters into an account
object of proving that it
Panjáb, but he makes no
mention of the fact that the principal seats of hemp cultivation, as a commercial article, are in Eastern Bengal, the Central Provinces, and Bombay The *Encyclopædia Britannica* has also fallen into the same mistake, and, indeed, illustrations might be multiplied to show that undue prominence has been given to the fact that the plant is grown in Garhwál, the

* See a farther page regarding Godavery District

The Cultivation of Hemp in India.

CANNABIS
sativa.CULTIVA-
TION

Panjab, and Kashmir, the more so since by most writers the true regions of Indian cultivation have been, to a large extent, overlooked.

his Report on the Cultivation of and Trade in Gánjá in Bengal (1877), has placed in the hands of the public a valuable treatise which deals both with the cultivation of the plant and the preparation of the narcotic. Dr Forbes Royle in 1855 issued his *Fibrous Plants of India*, a work

personal observations, supplemented by several less important publications, and Government reports, the following abstract regarding Indian hemp cultivation has been prepared.

(a) CULTIVATION FOR THE NARCOTIC.

For the
Narcotic.
337

Bengal Cultivation.—The method pursued in Eastern Bengal, according to Mr. Hem Chunder Kerner, is as follows:

over the field, and it is freely manured is ploughed into the soil, and the means of the cultivator will admit of the belief is that for hemp the land cannot be too often so treated. The thorough water, the rain into the Nuri ing of e sandy l May aft need be used (of Sept ready sary for on the up by

by fav and manured, the furrows ploughed, and all weeds removed. At this stage the plants begin to form their flowers, when the services of an expert, known

CANNABIS
sativa.

The Cultivation of Hemp in India.

CULTIVA-
TION.Fruits
injura
Ganja.

as the *gānjā*-doctor (*poddār* or *parakdār*) are called in This person
all the male or
lants.
Kerr
njure
gānjā
action
scape

detection, the result being that a certain number of the female plants are
fecundated, fruits and seeds being produced. These are thrashed out as
far as possible in the manufacture of the drug, the quality of which may

For the Fibre.

338

(b) CULTIVATION FOR THE FIBRE HEMP.

Indian Methods.—Dr. Royle very appropriately remarks: "There is
every reason for believing that the plant is of Eastern origin, while there
is no sufficient reason for thinking that the climate of Europe is so pecu-
liarly suited to the production of its fibre as to exclude those of its
native climes, especially here attention is paid to those where the plant
is grown on account of it
where it is cultivated for
latter requires exposure
sowing, while the growth of the fibre is promoted by shade and moisture,
which are procured by thick sowing" It has already been pointed out
that the regions suited for *ganja* cultivation are perfectly distinct from
those where it might be possible to develop an industry in the fibre.
However much it may be regretted it seems impossible to combine the two
industries, and it is an accepted fact that, unless utilisable as a paper
stock, the immense amount of stems annually destroyed by the *ganja*
cultivators must continue to be so.

Godavery
Hemp.
339

At the same time Mr. Morris, in his account of the Godavery District,
gives some interesting facts regarding the cultivation of hemp fibre. It is
planted in November and cut by the end of March. It is grown in drills
and never watered. Clay soils and those beyond the reach of inunda-

R100 a pull of land The bundles are buried in mud and left to rot for
about a week when they are taken out and beaten in the water, and after
all impurities are removed, the fibre is collected." The exports from the
district are said to have been, in 1854-55, 4,269 cwt

Unless there be some mistake, *Sunn* hemp having been called
"Cannabis sativa," for Mr. Morris gives that scientific name as well as
the vernacular name *sannum* for the fibre he is describing, this information
is of the greatest interest, as it would show, what the writer was not aware
of until recently, that hemp fibre was actually produced on the plains of
India

Cultivation of Hemp in India

CANNABIS
sativa

EARLY EXPERIMENTS IN HEMP CULTIVATION.—In 1802 the Government of India made various experiments on an extended scale to establish hemp fibre cultivation. European seed was imported, and farms and factories established but finally abandoned. Recourse was had to improving the cultivation of the Indian stock. The cultivation and manufacture was carried on at Rishra, Cussimpore, Maldah, Gorackpore, Mhow, Rohilkand, and Azimgarh, under the experienced supervision of European hemp dressers. The results were everywhere unsatisfactory and

CULTIVA-
TION
For the Fibre

THE POSSIBILITY OF MORE FAVOURABLE RESULTS.—In spite of the disheartening results, it cannot be definitely stated that it is impossible that hemp fibre can be produced in India. The efforts alluded to were mainly

Possible
Prospects

printed as it expresses pretty clearly Dr. Royle's view.—This (hemp)

Dr. Royle alludes to successful experiments of hemp cultivation in the plains, especially at Chittagong. But in most cases as was proved with the plant reared at Saharanpur, it is admitted that the plains crop is far

CANNABIS
sativa.

The Cultivation of Hemp in India.

CULTIVA-
TION.

as the *gānjā-doctor* (*paddār* or *parakdār*) are called in. This person

Fruits
injure
Ganja.

yielded by them is very inferior and scarcely saleable. The destruction of the *māddī* plants is, however, never so complete but that a few escape detection, the result being that a certain number of the female plants are fecundated, fruits and seeds being produced. These are thrashed out as far as possible in the manufacture of the drug, the quality of which may

For the Fibre.
338

(b) CULTIVATION FOR THE FIBRE HEMP.

Godavery
Hemp.
339

which are procured by thick sowing." It has already been pointed out that the regions suited for ganja cultivation are perfectly distinct from those where it might be possible to develop an industry in the fibre. However much it may be regretted it seems impossible to combine the two industries, and it is an accepted fact that, unless utilisable as a paper stock, the immense amount of stems annually destroyed by the *gānjā* cultivators must continue to be so.

At the same time Mr. Morris, in his account of the Godavery District, gives some interesting facts regarding the cultivation of hemp fibre. It is planted in November and cut by the end of March. It is grown in drills and never watered. Clay soils and those beyond the reach of inundation are those best suited. "About 2,200 bundles can be produced in one *putti* of land, each bundle yielding $1\frac{1}{2}$ viss of fibre, or a total of 3,300 viss or 412½ maunds, and is valued at one rupee a maund. The expenses of cultivation are estimated at Rs. 8, and those of the preparation of fibre at Rs. 100 a *putti* of land. The bundles are buried in mud and left to rot for about a week when they are taken out and beaten in the water, and after all impurities are removed, the fibre is collected." The exports from the district are said to have been, in 1854-55, 4,269 cwt.

Unless there be some mistake, *Sunn* hemp having been called "*Cannabis sativa*," for Mr. Morris gives that scientific name as well as the vernacular name *sanumu* for the fibre he is describing, this information is of the greatest interest, as it would show, what the writer was not aware of until recently, that hemp fibre was actually produced on the plains of India.

Cultivation of Hemp in India.

CANNABIS
sativa

EARLY EXPERIMENTS IN HEMP CULTIVATION.—In 1802 the Govern-

CULTIVA-
TION
For the Fibre.

Mhow, Rohilkand, and Azimgarh, under the experienced supervision of European hemp-dressers. The results were every where unsatisfactory and the experiments abandoned.

or the rejected stems from
but the enquiry in this

Possible
Prospects

printed, as it expresses pretty clearly Dr Royle's view — This (hemp)

would also be softer and more pliable at the same time that it retained a great portion of its original strength, and probably in as large a quantity as is yielded by the *sunni* plant. Thus, an article might be produced which, judging from the Italian samples, might enter into competition with the Russian product, and at all events afford much more valuable cordage than the general

Dr Royle alludes to successful experiments of hemp cultivation in the plains especially at Chittagong. But in most cases as was proved with the plant reared at Saharanpur, it is admitted that the plains crop is far

CANNABIS
sativa.

The Cultivation of Hemp in India.

CULTIVA-
TION
For the
Fibre

separate flowers and borne on separate plants The male plants (called

authors give accounts of the methods pursued in Europe in hemp culti-

Italian Hemp
340

Male Fibre
341

sowing, each is uprooted singly, care being taken not to injure the stem.
"The fibre is separated either by retting or by breaking and scutching"
(*Spens' Encycl*)

Properties and Uses of Cannabis sativa

ECONOMIC
PROPERTIES

From the STEMS, LEAVES or FLOWERS, and even the FRUITS a RESIN-
OUS EXTRACT, of a powerful narcotic character, may be prepared The
INNER BARK affords the valuable FIBRE HEMP The SEEDS are occa-

C. 341

The Narcotic—Indian Hemp

CANNABIS
sativa.

sionally eaten, they are much valued for feeding birds. An OIL is expressed from them which is of some importance, but can scarcely be called commercial.

RESIN OR NARCOTIC.

There are primarily three forms of this substance, but under each there exist also local modifications, special preparations from these, and adul-

BENGAL MANUFACTURE

(1st) *GANJA*—This is known in the trade as consisting mainly of two forms *Flat Ganja* and *Round Ganja*. Speaking of the manufacture of *ganja* in Bengal Mr Hem Chunder Kerr says—"In February and March, when *ganja* attains its maturity the cultivator proceeds to make arrangements for reaping the crop and preparing the drug. His first step is to present himself to the supervisor, show him the license under

GANJA
342

mening operations

Flat Ganja—The stems are cut with a sickle about 6 inches above

Flat
343

size. These are arranged on a mat in a circular form, with their points directed towards the centre and overlapping each other. The circle thus

firmly among the flowers in the desired form. Fresh twigs are then

mats are spread and the flowering twigs beaten two and two together so as to shake off the leaves or any fruits that may still remain and are re-arranged in a new circle, so that what was on the top before now forms the bottom

CANNABIS
sativa.

The Narcotic—Indian Hemp.

GANJA.

layer of the new circle. The treading is repeated stage by stage until the stack is again covered by the mats, and men take up their inexplicable seat on the top. After this each twig is trodden upon separately, being placed for

Round
344

thin sausage shape near the apex of the twig. This rolling is repeated

Chur or rora
345

ganja *Chi* Mr E. p. 761) says of the
ganja of th ced in Kumáon and
Garhwál is far as I am aware,
exported from the lower dis-
tricts. Tw ces—the *pattar* and
the *biluchar*. The *pattar* is imported chiefly from Holkar's territories
and is of quality inferior to the Bengal *ganja*. It is purchased at from
Rs 5 to 6 a maund in Indur in the rough state, and "pays a duty of
about 4 annas per maund on exportation to British territory." It is sold
retail at from Rs 3 to 4 a seer. The *biluchar* variety is imported from
Lower Bengal, and is sold at Rs 10 to 12 a seer.

BOMBAY AND THE CENTRAL PROVINCES.

IMITATIONS
OF GANJAExpressed
Juice
346
Decoction
347

Bengal is concerned, it may confidently be stated that adulteration can
C. 347

The Narcotic—Indian Hemp.

CANNABIS
sativa.

alone take place when the intoxicant reaches the hands of the dealer. In the *golas* it is quite pure.

The mention of *chur*, and of the extracts referred to by Dr. Irving,

which
int (see
accord-
to extract

CHARAS.
348

ground. The crop is reaped about November and the powder stored in small 24lb bags. About May these are sold to the traders, who cut the bags open and spread out the now partially agglutinated powder on cloths under the sun. It softens and deepens in colour and is hard pressed into bags or bales $1\frac{1}{2}$ maunds in weight (a half pony-load ready for exportation). The quality is judged of by the amount of oil seen through the until it is of t and exposing surface of th broken, is se pure steel. exposed, it linseed oil and a powder of the hemp leaves

From the above description it would appear as if Yarkand *charas* was

MOMEA.
349

Momea of
Nepal.
350

CANNABIS
sativa.

The Narcotic—Indian Hemp.

MOMEA

given internally in cases of wounds and ulcers along with *ghî*, dose one *masha*." It is noteworthy, in connection with Dr Gimlette's discovery regarding human fat used in the manufacture of Nepál *momea*, that amongst the ignorant classes of Northern India a superstition prevails that they may be captured and carried off to some distant land to be made into *momea*. This fact has been alluded to by various officers in

Mumial
351

several localities where bituminous products occur, as they are commonly sold as drugs in the bazars of that country. According to Captain Hutton (*Cal. Jour, Nat. Hist, Vol VI, 601*), a mineral pitch, called

salts of lime. There was no trace of bitumen or sulphur. In fact, this

Momyal
352

353

354

exude from a crack on the face of a high rock

There are thus numerous allusions to a substance or substances known in the bazars of India under the name *momea*, but in none of the published accounts of this drug is there the slightest reference to its being a product of Indian hemp, although, in the early literature of that narcotic, it is repeatedly stated that a pure waxy form of *charas* obtained from Nepál is sold under the name of *momea*.

CHARAS FROM
Sind
355
Central India
356

Charas is collected in Sind and in Central India by causing men to run through the hemp fields. They are said to be generally clad in leathern aprons to which the resin adheres, but in some cases are reported to have their bodies first oiled and then to run naked through the fields

C. 356

The Narcotic—Indian Hemp

CANNABIS
sativa.

CHARAS.

Trans Hima-
laya
357Garda or
Panjab
Charas

358

Surkhal,
Bhangra, and
Khaki

359

stirring about the *bhāng* and making hay of it. Soon a fine dust lies out and, filling the room, settles down on the surface of the cloth spread over the heaps. When all the dust has been shaken out and settled on the cloth the cloth is rolled up and shaken and it falls down like a

(3rd) BHĀNG OR SIDDHĪ, SĀBZI, AND SĀBZI—Apparently the wild plant is the chief source of this form of the drug, which consists of the mature leaves and in some parts of India of the fruits also. The resin is

BHANG.
360

article is taken into consideration

INDIAN PREPARATIONS FROM HEMP

FORMS OF INDIAN HEMP—As already explained there are three forms of this poisonous drug (a) *ganja*, the agglutinated female flowering tops and resinous exudation on these, (b) *charas*, a resinous substance found on the leaves, young twigs, and bark, and (c) *bhāng* or *siddhi*, the mature leaves,

Smoking
mixtures.

361

Hashish.

362

Majun

363

PRICES.

... and a ... growing within a certain radius of his hut, and it would be impossible to prohibit him gathering, from such a plant, the daily quantity used by himself and family. This is precisely the state

CANNABIS
sativa.

The Hemp Fibre of India.

of affairs which prevails over a great part of India, and, indeed, on the

Bedding for
Cattle.

plant, and the consumption can therefore be regulated by law. The Excise Act provides that licensed persons may cultivate the plant, prepare the narcotics, and retail these to the consumer. The right to vend is sold by public auction, a person purchasing thereby the sole right, for one year, to all or so many of the shops in a district. Any person, other than a licensed dealer, having in his possession more than a very small quantity at one time is liable to prosecution and fine. This system of farming the wholesale and retail shops exists all over India,—Madras

Excise
Arrange-
ments.

LOCALS.

THE FIBRE-HEMP.

FIBRE
364

The reader is referred to the account given of the cultivation of the hemp plant in a preceding page. It will there be found that a con-

When
Mature.

Lignification.

nd modes of culture, the plant in India, rittle character com- on due to the fact of e fibre at an earlier hus, for example, it plains of India, at

Saharanpur, grew vigorously, attained a height of 12 feet, and gave every promise of proving successful. When reaped, Dr. Falconer, however, reported that "the hemp-fibre did not retain the strength or

Experiments
to be per-
formed in
India.

microscopically and chemically examined once a fortnight, right through

The Hemp Fibre of India.

CANNABIS
sativa.

their subsequent growth, or until in each locality the period when lignification was reached by the plants had been determined. It would also be

FIBRE.

failed to discover such regions or were imperfectly conducted, for, with the exception of certain limited tracts of the Himalayas, no part of the plains of India can be said to have been discovered in which there is the least hope of hemp or flax cultivation becoming of much importance. (See remarks as to hemp in Godavery District No. 339).

In portions of the North-West Himalaya the hemp plant has been cultivated for its fibre for a very long time. Mr. Atkinson gives a brief but practical account of this industry in his *Himalayan Districts*

abolition of the

Separation
of Fibre.

lessens the value of the fibre very much, since it increases the labour in cleaning it, each hank requiring to be opened out by the hand.

must
must
must
true

CANNABIS
sativa.

The Hemp Fibre of India.

FIBRE.

EUROPEAN
HEMP,
366

ropes and twine. Where this competition proved unprofitable, substitutes were brought forward, and at the present day the most extensively used fibres in the rope trade may be said to be hemp, coir (or the fibre from the outer layer of the cocoanut), Manilla hemp, cotton, and sunn-hemp. Italy produces the finest hemp, France is perhaps next in importance, then Great Britain, Servia, Germany, and of Asiatic countries China is reputed to produce good hemp.

INDIAN FOREIGN TRADE IN "HEMP"

Raw Hemp
367Manufactures
368Cordage
369

		Foreign Hemp imported	Foreign Hemp exported	Indian Hemp exported.
		R	R	R
Raw Hemp	Raw Hemp	1881-82 . . . 1,10,875		5,59,112
		1882-83 . . . 1,82,993		4,30,325
		1883-84 . . . 1,76,765		6,85,376
		1884-85 . . . 2,14,118		5,82,679
		1885-86 . . . 1,96,052		9,88,825
Manufactures	Manufactured Hemp (excluding cordage)	1881-82 . . . 10,179	4,182	1,409
		1882-83 . . . 27,090	8,857	3,176
		1883-84 . . . 32,570	4,548	6,510
		1884-85 . . . 41,356	150	3,129
		1885-86 . . . 42,810	323	3,205
Cordage	Cordage and rope excluding jute, but otherwise the bulk probably Manilla Hemp and true Hemp	1881-82 . . . 3,22,485	24,886	3,25,173
		1882-83 . . . 4,31,693	15,596	2,84,166
		1883-84 . . . 3,90,584	11,198	4,92,063
		1884-85 . . . 3,52,413	13,076	3,53,389
		1885-86 . . . 3,24,519	7,417	3,28,320

Foreign Trade in Manufactured and Unmanufactured Hemp, excluding
Cordage

Year,	Imports	Exports and re-exports
	Value	Value
	R	R
1881-82	1,21,054	5,64,703
1882-83	2,10,083	4,42,353
1883-84	2,09,335	6,96,374
1884-85	2,55,474	5,85,953
1885-86	2,38,862	9,02,353

The Indian Hemp.

CANNABIS
sativa.

Detail of Imports, 1885-86

FIBRE
Imports.
370

Province into which imported	Value	Country whence imported	Value.
	R		R
Bengal	1,33,235	United Kingdom	83,431
Bombay	1,01,600	China	1,23,474
Madras	1,183	Philippines	2,609
Sind	2,844	Straits Settlements	17,827
		Other Countries,	11,521
TOTAL	2,38,862	TOTAL	2,38,862

Detail of Exports, 1885-86

Exports.
371

Province from which exported	Value	Country to which exported	Value
	R		R
Bengal	3,11,551	United Kingdom	6,18,607
Bombay	6,31,444	Belgium	2,56,566
Madras	40,358	Persia	11,438
		Arabia	15,698
		Other Countries	30,044
TOTAL	9,92,353	TOTAL	9,92,353

It has been found impossible to give the quantities, since the raw fibre is expressed in weight, cloth in pieces, and rope in balls of various lengths and weights.

OIL.

HEMP SEED
OIL.
372

gravity of 0.9252 at 15°C, it thickens at -15°C, and solidifies at -25°C to -27°C. It dissolves in boiling hot water and in 30 parts of cold alcohol.

MEDICINE.

MEDICINE.
373

CANNABIS
sativa.

The Indian Hemp as a Drug.

MEDICINE

Chur or Round
Ganja best
suited for
Pharmacy
Flat Ganja
and Charas
should be
avoided

to purchase
en allowing
a dealer or
er a permit
raised as to
stered as of
From what
to use for

ducing uterine contractions.

It is admitted by most Indian physicians to be of special merit in the treatment of tetanus and cholera and has not the injurious after effects which but too frequently result from
ever, very similar to that of opium,
habitual opium eater may take large
quantities of hemp without injurious consequences

Sir William O'Shaughnessy was the first European writer to draw prominent attention to the peculiar properties and actions of the hemp-narcotics. He experimented with these in Calcutta and published his results. The reader is referred to his *Bengal Dispensatory* and to a "Memor on the preparations of Indian Hemp" in the *Transactions of Medical and Physical Society of Calcutta* for 1839, and to two papers in the *Journal of the Asiatic Society*, Vol. VIII, of the same year. Shortly after the appearance of these most exhaustive accounts, the drug began to be experimented with in Europe.

The Indian Hemp as a Drug.

CANNABIS
sativa.Ainslie, in his *Materia Indica*, 2nd Vol., gives an interesting account of MEDICINE.

ferent ingredients, of which datura and opium are frequent. In some parts of India a beer is brewed with *bháng*, and this, together with *bháng* itself, *májant* and other preparations, are often employed in Native pharmacy.

and convenience, Indian Hemp is the next anodyne hypnotic and antispasmodic to opium and its derivatives, and often equal to it." Dr.

Makhsan, "the leaves make a good snuff for deterring the brain; their juice applied to the head - ear it allays rheas and go

Mat. Med. West India).

The medicinal properties of hemp, in various forms, are the subject of some interesting notes by Mirza Abdul Russac. "It produces a ravenous

CANNABIS
sativa.

The Indian Hemp as a Drug.

MEDICINE

tice has greatly decreased of late years owing to a feeling of insecurity as to the quality of the article. It is commonly recorded that no reliance can be placed on the strength of the material. The material at a moment of the

Chur or Round
Ganja best
suited for
Pharmacy
Flat Ganja
and Charas
should be
avoided

in cholera, menorrhagia and uterine hæmorrhage, rheumatism, hay fever, asthma, cardiac functional derangement, and skin diseases attended with much pain, and pruritus. In lingering and protracted labours depending upon atony of the uterus, it has been employed with the view of inducing uterine contractions.

It is admitted by most Indian physicians to be of special merit in the treatment of tetanus and cholera and has not the injurious after effects frequently result from similar to that of opium, in eater may take large

The Indian Hemp as a Drug.

CANNABIS
sativa.Ainslie, in his *Materia Indica*, 2nd Vol., gives an interesting account of

MEDICINE.

itself, *majum* and other preparations, are often employed in Native pharmacy.

... remarks, derived from some years' experience, from Calcutta, that it cures pain, obtains sleep, and put an end to spasm in circumstances under which morphia either did not suit or was objected to by the patient, and after wide experience with it I am quite satisfied that it is an excellent substitute for it, if given in sufficient doses. The difficulty is, to be always sure of the quality of the extract, or rather of the *ganja* from which the extract is obtained.

Uniformity in
quality.

and convenience, Indian Hemp is the next anodyne hypnotic and antispasmodic to opium and its derivatives, and often equal to it,' Dr.

applied externally
in inflammation, a poultice
erysipelas, neuralgia
administered internally."

Mat. Med. West India

The medicinal properties of hemp, in various forms, are the subject of some interesting notes by Mirza Asadullah Khan, who says, "the leaves of *Cannabis sativa* are said to be purified by being boiled in milk

smokers of *ganja* generally die of diseases of the lungs, dropsy, and anasarca, so do the eaters of *majun* and smokers of *siddhi*, but at a later period. The inexperienced, on first taking it, are often senseless for a day. Some go mad, others have been known to die.

Dr U. C. Dutt says that, according to the Sanskrit writers, "the leaves of *Cannabis sativa* are said to be purified by being boiled in milk

Leaves.
376

CANNABIS
sativa.

The Indian Hemp as a Drug

MEDICINE.

Dysentery.

Affections of
the eye
Piles.NASHA
377Oil used in
Rheumatism

Acute Mania

Hysteria.

Orchitis

Asthma
Chronic Cough

Charas of the trade, but it is terribly adulterated. The plant is called The oil extracted from the remedy, applied by rubbing (Hitchison, Simla) "Used in useful in atonic dyspepsia and di

in dysuria, and in relieving pain in dysmenorrhœa" (Dr E. G. Russell, Superintendent, Asylums, at Presidency General Hospital, Calcutta). "Commonly used as a narcotic, a few grains of the leaves called *siddhi* rubbed in with cardamom and other spices to allay pain, taken as a drink

mixed with other drugs and spices, forms an useful compound in diarrhœa and indigestion of children" (Assistant Surgeon Shub Chunder Bhattacharya, Chanda, Central Provinces) "The leaves, which are known as

The Indian Hemp as a Drug

CANNABIS
sativa.

(Dr G Price Civil Surgeon Shalabad) — It is also used in the form of tincture for the form of elixir

MEDICINE
Ague Fits
Impotence

from a medical point of view, are the *Resin* and *Volatile Oil*

"The former was first obtained in a state of comparative purity by T and H Smith in 1846. It is a brown amorphous solid, burning with a bright white flame and leaving no ash. It has a very potent action

CHEMICAL
COMPOSITION

small crystals. With due precautions it may be separated into two bodies the one of which named by *Personne Cannabene* is liquid and colourless, with the formula $C_{15}H_{22}$, the other which is called *Hydride of Cannabene*, is a solid separating from alcohol in platy crystals to which *Personne* assigns formula $C_{15}H_{22}$. He asserts that *Cinnabene* has

Cannabene
378

from the oil which he obtained from the fresh herb, just after flowering, to the extent of 0.3 per cent.

"It remains to be proved whether an *alkaloid* is present in hemp, as suggested by *Preobraschensky*.

The other constituents of hemp are those commonly occurring in other plants. The leaves yield nearly 20 per cent of ash.

As to the *resin* of *Indian hemp* *Bolas* and *Francis*, in treating with

from purified resin of *charas*, but without success" (*Fluck and Hanb. Pharmacog. page 549*)

Dr Dymock (in his 2nd Ed of the *Materia Medica of Western India*) goes into considerable detail on the chemistry of this drug. *Preobraschensky* discovered in *China haschisch*, a volatile alkaloid which he believed to be identical with nicotine. *Dragendorff* and *Marquiss*

published his conviction that hemp contained several alkaloids the principal one being a substance he named *Tetano-cannabine*. More recently to all these published results of the chemical investigation of the narcotic resin

CANOES.

The Indian Hemp Canoes.

oil contained phenol, ammonia, and several other of the usual products of destructive distillation.

"The nicotine like principle contained in this oil appeared to be an alkaloid. It formed salts which evolved a strong nicotine-like odour when acted on by alkalis. But physiologically it was found to be inert, and therefore was evidently not identical with nicotine" (*Ind. Med. Gas*, Dec 1884)

FOOD.

FOOD,
379

Food — Messrs Duthie and Fuller, writing about the Himálayan tracts within the North-Western Provinces, say that the seed is not uncommonly roasted and eaten by the hill-men, and that after the oil is expressed the oil-cake is given to their cattle. Dr Stewart writes that on the Sutlej the seeds are roasted and eaten in small quantities with wheat.

DOMESTIC AND INDUSTRIAL USES.

DOMESTIC,
380

Cannable Composition — "This material for architectural decoration is described by Mr B. Albans to have a basis of *hemp* amalgamated with sheets of large pness of detail than half the elastic to be adapted to wall surfaces, bearing blows of the hammer and resisting all

oil varnish, the material is so hard as to allow gold to be burnished after gilding the ornaments made of it" (*Ure*, I, 611).

CANOES

See Boats, Vol I., B 548

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TIMBERS USED FOR CANOES, DUG-OUTS, TROUGHS, WATER PIPES, DRINKING CUPS, &c.

- 1 *Acer cerasium*, *Will* (drinking cups made in Tibet)
- 2 *A. oblongum*, *Wall* (drinking cups)
- 3 *A. pictum*, *Thunb* (drinking cups made of knotty excrescences).
- 4 cups).
- 5
- 6
- 7
- 8 *Artocarpus Chaplasha*, *Roxb* (much used for canoes).
- 9 *A. Lakoocha*, *Roxb* (canoes)
- 10 *A. nobilis*, *Thw* (Ceylon canoes)
- 11 *Boehmeria rugulosa*, *Wedd* (Lepchas make cups, bowls, and tobacco-boxes)

C. 381

Woods used for Canoes, Dug-outs, &c.

CANSCORA
decussata.

- 12 .
13 .
14 .
15 .
16 .
17 .
18 .
19 .
20 .
21 .
22 .
23 . boats
and canoes)
24 *Draabanga sonneratioides*, Buch. (canoes, cattle-troughs cut out of green wood)
25 *Dysoxylum Hamiltoni*, Hiern (canoes)
26 *D. procerum* Hiern (Assam canoes)
27 *Giretia rottleriformis*, Griff (catamarans).
28 *Gmelina arborea*, Roxb (clogs, canoes, &c.).
29 *Gyrocarpus Jacquini*, Roxb. (preferred above all other woods for catamarans)
30 *Hopea odorata* Roxb (Burma canoes)
31 *Juniperus excelsa*, M. Bieb (drinking cups).
32 *Lagerstræmia Flos-Reginæ*, Retz (boats and canoes).
33 .
34 .
35 .
36 .
37 .
38 .
39 .
40 .
41 .
42 .
43 .
44 *Populus ciliata*, Wall (water troughs)
45 *Sarcosperma arborea*, Hook (Sikkim canoes).
46 *Schuna Wallichii*, Choisy (Assam canoes)
47 *Shorea obtusa*, Wall (canoes).
48 *S. robusta*, Gartin (Hills of Northern Bengal, canoes)
49 .
50 .
51 .
52 .

CANSCORA, Lam, Gen Pl., II, 811.

Canscora decussata, R. & Seb., Fl. Br. Ind., IV., 104; Bot. Mag., t. 3066, GENTIANACEÆ

Syn *PLADERA DECUSSATA*, Roxb., Fl. Ind., Ed. C. B. C., 135

Vern — *Sankhdhul*, HIND; *Dankuni*, BANG; *Shun khapushopp*, CUTCH; *Sankhopushpi dandotpala*, SANS

References — Thwaites En. Ceylon Fl., 204, Voigt, Hort. Sub. Cal., 510; U. C. Dutt, Mat. Med. Hind., 201, 296, 316, Dymock, Mat. Med., W. Ind., 451; also 2nd Ed., 542

CANTHIUM
didymum.

Cantharides; Canthium.

MEDICINE
383

Habitat—Common throughout India from the Himālaya to Burma, ascending to 4,000 feet, is abundant in the plains of Bengal and not uncommon in Ceylon

Med. Hind., 201).

Special Opinions.—§ "This deserves a trial" (Surgeon-Major C. F. McKenna). "Laxative, tonic, expectorant" (Dr. W. Barren, Bhuj, Cutch).

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Canscora diffusa, Br., Fl. Br. Ind., IV., 103; Wight, Ic., t. 1327 (not [of Clarke])

Syn.—PLADERA VIRGATA, Roxb., Fl. Ind., Ed. C. B. C., 134

Vern.—Kyauk pan, BURM

References.—Thwaites, En. Ceylon Pl., 204, Dals. and Gids., Bomb. Fl., 158, Voigt, Hort. Sub. Cal., 520

Habitat—Common throughout India, ascending to 4,000 feet, from Kumāon and Bhutan to Ceylon and Penasserim

Medicine.—Used as a substitute for C. decussata

MEDICINE.
385
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C. sessiliflora, Roem. and Sch., Fl. Br. Ind., IV., 104

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CANTHARIS, Latreille

Cantharis vesicatoria, Latreille, COLEOPTERA.

CANTHARIDES, BLISTERING BEETLE, SPANISH FLIES, Eng., MOUCHES D'ESPAGNE, Fr., SPANISCHE FLIEGEN, Germ., CANTERELLE, It., HISCHPANSKIE MUCHI, Rus., CANTHARIDES, Sp.

Blistering
insect
388

References.—Pharm. Ind., 274; U. S. Dispens., 15th Ed., 342, Spons., Encyclop., 796, Balfour, Cyclop., Ure & Dic. of Arts and Manufactures

Habitat.—A dried insect imported into India and sold by chemists. For indigenous insects used as substitutes, see Mylabris cichorii, Fabr.

389

CANTHIUM, Lam., Fl. Br. Ind., III., 131.

The Genera Plantarum reduces the above genus to PLECTRONIA, Linn.; but CANTHIUM has been retained in the Flora of British India, which puts PLECTRONIA (in part) under CANTHIUM

390

Canthium didymum, Roxb., Fl. Br. Ind., III., 132; RUBIACEÆ

Vern.—Garbha gojha, SANTAL, Yerholi, TAM., Yellal, porawa mara, Gal. koranda, SING., KAN

References.—Roxb., Fl. Ind., Ed. C. B. C., 180; Kuhn, Fl. Burm., II., 359, Thwaites, En. Ceyl. Pl., 152, Bom. Gaz., XV., 65

Habitat.—A shrub or small tree found in the Sikkim Himālaya at an altitude of 1,500 feet and distributed east to the Khasia and Jyntea mountains. It also is met with in Chutia Nagpur and in the Western Peninsula from the Concan southwards to the Malayan Peninsula and Ceylon

C. 390

Canthium • Canvas

CANVAS.

Medicine — Bark used by the Santals in fever (Rc. A. Campbell)

Structure of the Wood.—Hard heavy, and close-grained, yellowish, with central masses of black (*Pomb Gas*) this is very much like the description of the wood, as given by Brandis and by Lisboa for *C. umbellatum*.

MEDICINE.

391
TIMBER.
392

Canthium parviflorum, Lamk, *Fl Br Ind.*, III, 136

Syn — WEDERA TETRANTRA, *Hall*!, KANIKEN KARA in *Rhe de, Hort*
Vol. 1, p. 38

393

Vern — AIRNI, BOMB, KARAI-CHETTI, TAM, TSJÉTON KARD, MAL, DALUSU,
CHETTI, BALSU, TEL (AINSLIE), ADRA, SING

$$R_{\beta}^{\beta} = \beta - \alpha - \gamma = 180^\circ - 120^\circ - 30^\circ = 30^\circ$$

Habitat.—A shrubby plant met with at altitudes of 4,000 feet, in the

MEDICINE.

394

FOOD

395

TIMBER.

396

307

C. umbellatum, *Wight, Ic.*, t 1034; *Fl Br Ind*, III, 132.

SYN—*PLECTRONA DIDYMA*, *Benth & Hook*; *Brandis*, *For Fl*

Vern—Arzil, BOMB, Neckamie, nalla, balss, TAM & TEL; Abalu,
KAN, Tolan, URIYA

References.—Brandis, *For Fl.*, 376; Bedd, *Flor Syl.*, 221; Dals & Gids, *Bomb Fl.*, 113; Gamble, *Man Timb.*, 230 (under *Plectonla didyma*, Benth & Hook); Laxson, *U Pl.*, Bomb, 87.

Habitat—An evergreen tree met with in the Western Peninsula (on the Ghats at altitudes of 4,000 to 8,000 feet) and distributed south to Tenasserim and Ava.

Structure of the Wood-Hughes Group, $n = 3$

white or chocolate-
centre (*Brandis*)

small, numerous &

and numerous C

black wood (Cot

Timber is used for agricultural purposes

TIMBER.

308

Canvas

CANVAS.

SAILCLOTH, *Eng*, KANEVAS and SEGELTUCH, *Germ.*, CANEVAS and TOILE-A-VOILE, *Fr*, ZEILDOK, *Dut*; LONA, *It*, *Port*, *Sp*, CANEVAZZA, *It*, *Port*; PARUSSINA, PARUSSNOE POLOTNO, *Rus*, KITAN, *Tam.*, *Tel*

300

1.

It is employed by artists for painting on

C. 399

CANTHIUM
didymum.

Cantharides; Canthium.

Habitat—Common throughout India from the Himalaya to Burma, ascending to 4,000 feet, is abundant in the plains of Bengal and not uncommon in Ceylon

MEDICINE
383

Med Hind 201

Special Opinions—§ This deserves a trial" (*Surgeon Major C F. McKenna*). "Laxative tonic, expectorant" (*Dr. W. Barren, Bhuj, Cutch*).

384 *Canscora diffusa*, *Br, Fl Br Ind, IV, 103, Wight, Ic, 1 1327 (not [of Clarke])*

Syn—*PLADERA VIRGATA*, *Roxb, Fl Ind, Ed C B C, 134*

Vern—*Ayauk pan*, *BURN*

References—*Thwaites, En Ceylon Pl, 204, Dals and Gibs, Bomb Fl, 158, Voigt Hort Sub Cal, 520*

Habitat—Common throughout India, ascending to 4,000 feet, from Kumaon and Bhutan to Ceylon and Tenasserim

Medicine—Used as a substitute for *C. decussata*

MEDICINE
385
386

C. sessiliflora, *Roem and Sch, Fl Br Ind, IV, 104*

387

CANTHARIS, *Latreille*

Cantharis vesicatoria, *Latreille, COLEOPTERA*

CANTHARIDES BLISTERING BEETLE SPANISH FLIES, *Eng*,
MOUCHES DESPAGNE *Fr*, **SPANISCHE FLIEGEN**, *Germ*,
CANTERELLE, *It*; **HISCHPANSKIE MUCHI**, *Rus*, **CANTHARIDES**, *Sp*

References—*Pharm Ind, 274 U S Dispens, 15th Ed, 342, Spens, Encyclop 796 Balfour, Cyclop, Ure's Dic of Arts and Manufactures*

Habitat—A dried insect imported into India and sold by chemists

For indigenous insects used as substitutes see *Mylabris cichorii*, *Fabr.*

Blistering
Insect.
388

389

CANTHIUM, *Lam, Fl Br Ind, III, 131.*

The *Genera Plantarum* reduces the above genus to *PLECTRONIA* *Linn*, but *CANTHIUM* has been retained in the *Flora of British India*, which puts *PLECTRONIA* (in part) under *CANTHIUM*

390 *Canthium didymum*, *Roxb; Fl. Br Ind, III, 132, RUBIACEÆ*

Vern—*Garbha gotha*, *SANTAL*, *Yerkoli* *TAM*, *Yellal*, *porawa mard*, *Gal karanda*, *SING, KAN*

References—*Roxb, Fl Ind, Ed C B C, 180, Kurz Fl Burm, II, 359 Thwaites, En Ceyl Pl, 152, Bom Gaz, XV, 65*

Habitat—A shrub or small tree found in the Sikkim Himalaya at an altitude of 1,500 feet and distributed east to the Khasia and Jyntea mountains. It also is met with in Chutia Nagpur and in the Western Peninsula from the Concan southwards to the Malayan Peninsula and Ceylon

C. 390

Canthium: Canvas.

CANVAS.

Medicine — Bark used by the Santals in fever (Rev A. Campbell)

Structure of the Wood — Hard heavy, and close-grained, yellowish, with central masses of black (Lomb Gar) This is very much like the description of the wood, as given by Brandis and by Lisboa for *C. umbellatum*

MEDICINE.

301
TIMBER.
392

393

Canthium parviflorum, Lamk., *Fl Br Ind.*, III, 136

Syn — *WEPERA TETRANTRA*, Hill, *KANDEN KARA* in Rhe. de, Hort Vat., 1 t 36

Vern — *Airmi*, BOM, *Kavar-cheddi*, TAM, *Tajeran kard*, MAL, *Balusu*, *chettu*, *lalsu*, TEL (KINSLIP), *Kdra*, SING

References — *Roxb.*, *Fl Ind.*, *E I C B C*, 170, *Gamble*, *Man Timb.*, 230, *Amie*, *Vat Vat II*, 63, *Dymock*, *Mat Med.*, *W Ind.*, 713, and 2nd Ed., 409, *Lisboa*, *V Pl*, *Bomb.*, 162, *Thwaites*, *En Cey Pl*, 152, *Trinens Cat Ceyl Pl*, 41

Habitat — A shrubby plant met with at altitudes of 4,000 feet, in the

MEDICINE,

394

FOOD

395

TIMBER.

396

397

C. umbellatum, Wight, *Ic.*, t 1034, *Fl Br Ind.*, III, 132

Syn — *ELECTRONA DIDYMA*, Benth & Hook, Brandis, *For Fl*

Vern — *Arasu*, BOM, *Neckanie*, *nalla*, *balusu*, TAM & TEL, *Abalu*, *KAN*, *Tolan*, *URIYA*

References — Brandis *For Fl*, 276, *Bedd*, *Flor Sylv.*, 221, *Dals & Gibs*, *Bomb Fl*, 113, *Gamble*, *Man Timb.*, 230 (under *Plectonoma didyma*, Benth & Hook), *Lisboa*, *V Pl*, *Bomb*, 87

Habitat — An evergreen tree met with in the Western Peninsula (on the Ghats at altitudes of 4,000 to 8,000 feet) and distributed south to Tenasserim and Ava

Structure of the Wood — Hard, close-grained, and heavy, yellowish

TIMBER.

398

14 numerous samples makes no mention of the irregular masses of black wood (Compare with *C. didymum*) Weight 57lb a cubic foot.

Timber is used for agricultural purposes

CANVAS.

Canvas.

399

SAILCLOTH *Ing*, *KANEVAS* and *SEGELTUCH*, *Germ*, *CANEVAS* and *TOILE A VOILE*, *Fr*, *ZEHDOCK*, *Dut*; *LOVA*, *It*, *Port*, *Sp*, *CANEVATTA*, *It*, *Port*; *PARUSSINA*, *PARUSSAOE*, *POLOITNO*, *Rus*, *KITTAN*, *Tam*, *Tel*

CAPPARIS
sepiaria

The Wild Caper berries

References — D — J — E — E — F — E — E — D — I — A — C —

277 Balfour Cyclop

ig in most parts of India

MEDICINE
Leaves

- 417
- Bark
- 418
- Fruit
- 419

FOOD

420

FODDER

421

TIMBER

422

423

on the Economic Products of Chitra Nagpur)
Special Opinion — § A decoction of the leaves is used in syphilis"
(Surgeon Major D R Thompson 1st District Madras)
Food — In the Southern Panjab and S and the fruit is made into pickle
(Stewart) The twigs shoots and leaves are greedily eaten by goats and
elephants
Structure of the Wood — Yellowish white, moderately hard, weight
about 47lb per cubic foot Used as fuel

Capparis multiflora, Hook f & Th, Fl Br Ind, I, 178

Vern — Suntri NEPAL

References — Kura For Fl Burm I 61 Gamble Man Timb, u

Habitat — A climbing thorny shrub of the Eastern Himalaya and
Upper Burma

Structure of the Wood — White moderately hard

TIMBER

424

425

C olacifolia, Hook f & Th, Fl Br Ind I, 178

Vern — Naski has NEPAL Jhenok LEPCHA

References — Gamble, Man Timb 15 u

Habitat — A thorny shrub of the Sub H malayan tract from Nepal to
Assam chiefly in the undergrowth of Sissu forests along river banks

Structure of the Wood — White, hard, weight about 44lb per cub ft

TIMBER

426

427

C sepiaria, Linn; Fl Br Ind I 177

Vern — Hian garna hius Pb Kanté gur kama; kiliakara BENG
Kants kapals URUYA Kanthár, Guj Neila uppi TEL Ah nsra kahd
dan SANS

References — Roxb Fl Ind Fd C B C 425 Brandis For Fl 15
Kura For Fl Burm I 65 Gamble Man Timb u Thwaites
Enum Ceylon Fl 16 Dals & Gbs Bomb Pl 10 Aitchison Cat
Pb Pl 10; Vogt Hort Sub Cal 75 Murray Drugs and Pl Sind
54 Royle Ill Him Bot I 72 Balfour Cyclop

MEDICINE

428

cau
ton

TIMBER

429

DOMESTIC

430

Sera npore)

Structure of the Wood — White hard, pores moderate sized
Domestic Uses — The branches make excellent hedges

C. 430

The True Caper-berry.

CAPPARIS
spinosa

431

Capparis spinosa, Linn, Fl Br Ind, I, 173

THE EDIBLE CAPER

Syn.—C MURRAYANA, Graham; Nacht, Ic, t 379

Vern.—*Aabra* ber, HIND, *Aabra*, LADAK, TIBET, *Ulla kanta*, KUMAON, *Aaur*, *kiari bauri*, *ber*, *bandar*, *bassar*, *kakri*, *kander*, *taker*, *barar*, *keri*, *kabra kabarra*, *karrari bauri*, P^W, *Aufcari*, SIND, *habar*, BOMB, *habarra kabarra* ALG, *habar kabur* ARAB, *Abbar*, PERS (In Persia it is known as *habar*, *karak*) *habar*, SYRIAN, *habarish*, TURKISH

Habitat.—This is the plant which affords the Caper berry of Europe. It occurs in India in the central and northern parts of the Panjab and in Sind, is less frequent in Rajputana than *C. aphylla*.

Medicine.—Dr Stewart remarks that in Kangra the roots are said to be applied to sores. The author of the *Makhan-ul-Adwiyā* considers the root bark "to be hot and dry and to act as a detergent and astringent,"

MEDICINE.
Roots432
Root-bark.433
Juice.

434

Buds
435

considered diuretic, and was formerly employed in obstructions of the liver and spleen, amenorrhoea, and chronic rheumatism."

Chemical Composition.—"The root-bark is said to contain a neutral bitter principle of sharp irritating taste, and resembling senegin. The flower-buds, distilled with water, yield a distillate having an alliaceous odour. After they have been washed with cold water, hot water extracts from them Capric acid ($C_{10}H_{20}O_2$), and a gelatinous substance of the Pectin group, Capric acid is sometimes found deposited on the calices of the buds in white specks having the appearance of wax (*Rochleder and Blas*)" (*Watts' Dict. Chemistry*)

CHEMISTRY.
436

Food.—In Europe this furnishes the Caper. Mr Edgeworth found the buds (prepared in the style of "Capers") to answer very well as a substitute for the European congener. In India the ripe fruit is either eaten raw or made into pickle. In Sind and in some parts of the Panjab, a compound of oil, mustard, fœnu greek, &c., is used in pickling capers. In Ladak the leaves are eaten as greens.

FOOD
437
Berries.
Pickle.
438
Leaves.439
FODDER.
440

Fodder.—The leaves and ripe fruits constitute a favourite food of goats and sheep.

CAPSICUM
annuum

Capsicum or Red Pepper

441

Capparis zeylanica, Linn Fl Br Ind I 174Syn — *C ACUMINATA* Roxb *C BREVISPIGA* DCVern — *Kalo-kera* BENG *Authoondy kai* TAMReferences — *Vaigt Hort Sub Cal*, 74 *Dals & C Balfour Cyclop*

Habitat — Common in the Carnatic and Malabar, &c Western Dekkan and in the drier parts of Ceylon

Food — The green fruit is pickled

FOOD
Pickled
442CAPSELLA, *Manch*, Gen Pl, I 86

443

Capsella Bursa pastoris, *Manch*, Fl Br Ind I 159

SHEPHERD'S PURSE PICKPOCKET, Eng BOURSE DE T

Fr HIRTENASCHE Germ

Habitat — A weed in the vicinity of cultivation throughout the regions of India, particularly abundant on the N W H

Medicine — This very common weed is bitter and pungent volatile oil on distillation identical with oil of mustard and has b

MEDICINE
444

oil

445

FOOD

446

447

CAPSICUM, Linn Gen Pl, II, 892

The greatest confusion exists in Indian literature as to the cultivated species of *Capsicum*. Popularly the larger fruits are usually designated *Capsicum* and the smaller *Chilies*. According to Firminger the powdered seeds of the latter constitutes Cayenne pepper. That author in his *Manual of Gardening for India* states that there are a great many varieties of *Capsicum* grown in

Belongs to 411 species alike

448

Capsicum annum, Linn DC Prodr XIII Pl 1 412 SOLANACE

RED PEPPER

Vern — *Mattisa wāngru* Lāl m rech murch murch gachn rech HIND

References — *Roxb Fl Ind Ed C B C* 193 *Stewart Pb Pl* 156
DC Orig of Cult Pl 289 *Vaigt Hort Sub Cal* 510 *Pl Arn Ind*
q a n

428

TIMBER
429
DOMESTIC
430ca
ton

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St

Dol

C. 430⁸

Capsicum or Red Pepper.

CAPSICUM
annuum.

Habitat.—A native of equatorial America, most probably of Brazil. Commonly cultivated for its fruit throughout the plains of India, and on the lower slopes of hills in Kashmir, and in the Chenab valley up to altitude 6,000 feet. When grown on the hills it is said to be very pungent. There are seven varieties, differing chiefly in the length, shape, and colour of the fruit, some being round, others oblong, of luscious, pointed or bifid, some horn-shaped, and red, white, yellow, or variegated. It is probable that most Indian authors have confused this species with *C. minimum*, which see.

History.—This species has a number of different names in European languages, which all indicate a foreign origin, and the resemblance of the taste to that of pepper. In French it is often called *poivre de Guinée* (Guinea pepper) but also *poivre du Indes* (Indian, Brazilian pepper). A denomination to which no importance can be attributed. Its cultivation was introduced into Europe in the sixteenth century. It was one of the peppers that Piso and Maxgraf saw grown in Brazil under the name *guajá* or *guajá*. They say nothing as to its origin. (*DC Orig. of Cult. Pl.*) "Chilies are not mentioned by any Sanskrit writer, consequently their introduction into India must have taken place at a comparatively recent date. It is probable that the Portuguese brought the fruit from the West Indies. Up to the present time the cultivation of the plant is carried on more extensively at Goa than at any other place on the western coast, and capsicums are well known in Bombay by the name of *Goa mirchi* (Goa pepper) (*Dr Dymock, Mat. Med. W. Ind.*) Hovee alludes to Capsicum as known in Bombay in 1787 and expresses no astonishment at its existence in India.

CULTIVATION OF CAPSICUM.—A light well-manured soil is the best for all kinds, in which the plants should be picked out at about four inches apart when they attain a growth of three inches, and afterwards put out into a bed of rich light earth when they attain six inches in height, giving them a good supply of water and keeping them clear from weeds. (*The Gardener*)

Medicine.—Dr Stewart says that the fruit is used externally in the form of plasters and taken internally in cholera, it is eaten from a conviction that it counteracts the effects of bad climates.

As a drug red pepper is considered by the natives as stomachic and stimulant, and is used externally as a rubefacient (*Dymock*). It has been employed with success as a topical application to elongated ulcers and relaxation of the pendulous veil of the palate. Made into a lozenge with sugar and tragacanth, it is a favourite remedy for hoarseness with professional singers and public speakers. In putrid sore-throat whether symptomatic or

very usefully employed in lethargic affections.

bitters, tonics and other stimulants in weak states of the stomach, in cold leucophlegmatic habit, dyspepsia and flatulence and as a gargle in relaxed states of the throat it is highly extolled and has also been used with success in the advanced stages of rheumatism. In native practice it is given in conjunction with asafoetida and sweet flag root, in cholera. By German physicians it is supposed to be particularly injurious in gonorrhoea" (*Murray's Pl. and Drugs of Ind.*)

Dr Sakhambari Arjun says that the fruit is used as a stimulant in snake bite.

Chemical Composition.—"Bucholz in 1816, and about the same time Braconnot, traced the acridity of capsicum to a substance called *capsicin*.

449

450

MEDICINE
Plasters.
451Lozenges.
452

CAPSICUM
annuum

Capsicum or Red Pepper

- 441 *Capparis zeylanica*, Linn , *Fl Br Ind*, I, 174
 Syn — *C ACUMINATA*, Roxb *C BREVISPIA* DC
 Vern — *Kalo kera* BENG , *Anthoondy kai* TAM
 References — *Voyt Hort Sub Cal*, 74, *Dals & Gibs*, *Bomb Fl*, 9,
Balfour, *Cyclop*
 Habitat — Common in the Carnatic and Malabar, occasional in the
 Western Dekkan and in the drier parts of Ceylon
 Food — The green fruit is pickled

FOOD
Pickle
442CAPSELLA, *Manch*, *Gen Pl*, I 86

- 443 *Capsella Bursa pastoris*, *Manch*, *Fl Br Ind*, I, 159, CRUCIFERÆ
 SHEPHERD'S PURSE, PICKPOCKET, *Eng*, *BOURSE DE PASTURE*,
Fr, *HIRTENASCHE*, *Germ*
 Habitat — A weed in the vicinity of cultivation throughout the tem-
 perate regions of India, particularly abundant on the N W Himalaya

MEDICINE
444
Oil
445
FOOD
446

natives as a pot herb "

- 447 CAPSICUM, Linn , *Gen Pl*, II, 892

be given to all the species at ke

- 448 *Capsicum annuum*, Linn , *DC Prodr*, XIII Pl 1 412, SOLANACEÆ
 RED PEPPER
 Vern — *Mattisa wánggrá* *lal mirch* *marcha mirch* *gáchmirch* HIND

DURN
 References — *Roxb Fl Ind Ed C B C* 193 *Stewart Pb Pl* 156

428

TIMBER
429
DOMESTIC
430ca
ion
Sera
St
Do
C. 4⁸

Capsicum or Red Pepper.

CAPSICUM
annuum.

Habit.—A native of equatorial America, most probably of Brazil. Commonly cultivated for its fruit throughout the plains of India, and on the lower hills such as in Khasi, and in the Chenchu valley up to an altitude 6,500 feet. When grown on the hills it is said to be very pungent. There are seven varieties, differing chiefly in the length, shape, and colour of the fruit, some being round, others oblong, of tase, pointed or bifid, smooth or rugose, and red, white, yellow, or variegated. It is probable that most Indian authors have confused this species with *C. minimum*, which see.

History.—This species has a number of different names in European languages, which all indicate a foreign origin, and the resemblance of the taste to that of pepper. In French it is often called *poivre de Guinée* (Guinea pepper), but also *poivre du Brésil, d'Inde* (Indian, Brazilian pepper), &c., denominations to which no importance can be attributed. Its cultivation was introduced into Europe in the sixteenth century. It was one of the peppers that Piso and Maxgravia grew in Brazil under the name *guia* or *guia*. They say nothing as to its origin. (*DC. Orig. of Cult. Pl.*) "Chilies are not mentioned by any Sanskrit writer, consequently their introduction into India must have taken place at a comparatively recent date. It is probable that the Portuguese brought the fruit from the West Indies. Up to the present time the cultivation of the plant is carried on more extensively at Goa than at any other place on the

449

apart when they attain a growth of three inches; and afterwards put out into a bed of rich light earth when they attain six inches in height, giving them a good supply of water and keeping them clear from weeds" (*The Gardener*).

450

Medicine.—Dr. Stewart says that the fruit is used externally in the form of plasters and taken internally in cholera; it is eaten from a conviction that it counteracts the effects of bad climates.

MEDICINE.
Plaster.
451

As a drug, red pepper is considered by the natives as stomachic and stimulant, and is used externally as a rubefacient (*Dymock*). "It has been employed with success as a topical application to elongated uvula

Lozenge.
452

white. Made into a lozenge, remedy for hoarseness with a putrid sore-throat whether fusion of red pepper are often

snake-bite

Chemical Composition.—"Bucholz in 1816, and about the same time Braconnot, traced the acidity of capsicum to a substance called *capsicin*.

CHEMISTRY.
453

C. 453

CAPSICUM
annuum.

Capsicum or Red Pepper.

CHEMISTRY.

It is obtained by treating the alcoholic extract of ether, and is a thick yellowish red liquid, but slightly soluble in water. When gently heated it becomes very fluid, and at a higher temperature is dissipated in fumes which are extremely irritating to respiration. It is evidently a mixed substance consisting of resinous and fatty matters.

"Felleter, in 1869, exhausted capsicum fruits with dilute sulphuric acid and distilled the decoction with potash. The distillate which was strongly alkaline and smelt like *conine*, was saturated with sulphuric acid, evaporated to dryness and exhausted with absolute alcohol. The solution, after evaporation of the alcohol, was treated with potash and

isolating it in sufficient quantity to allow of accurate examination.

"Dragendorff states (1871) that petroleum ether is the best solvent for the alkaloid of capsicum, he obtained crystals of its hydrochlorate, the aqueous solution of which was precipitated by most of the usual tests, but not by tannic acid.

"The colouring matter of capsicum fruits is sparingly soluble in alcohol, but readily in chloroform. After evaporation an intensely red soft mass is obtained, which is not much altered by potash, it turns first blue, then black, with concentrated sulphuric acid, like many other yellow colouring substances. By alcohol chiefly *palmitic* acid is extracted from the fruit, as shown by Thresh in 1877.

The crystals melted at 38°C . On keeping them for some days, at the

caustic lye removes *capsicin*, which is to be precipitated in minute crystals by passing *carbolic* acid through the alkaline solution. They may

Cayenne Pepper or Chillies.

CAPSICUM
frutescens.

CHEMISTRY.

be purified by recrystallizing them from ether alcohol, ether, benzene, glacial acetic acid, or hot bisulphide of carbon; in petroleum capsaicin is but very sparingly soluble, yet dissolves abundantly on addition of fatty oil. The latter being present in the pericarp is the cause why capsaicin can be extracted by the above process.

"The crystals of capsaicin are colourless and answer to the formula $C_{15}H_{25}O_4$; they melt at $59^{\circ}C.$, and begin to volatilize at $115^{\circ}C.$; but decomposition can only be avoided by great care. The vapours of capsaicin are of the most dreadful acridity, and even the ordinary manipulation of that substance requires much precaution. Capsaicin is not a glu oxide; it is a powerful rubefacient, and taken internally produces very violent burning in the stomach" (*Pharm. ograptis*).

Special Opinions.—"Stimulant and rubefacient, useful in dyspepsia; recommended in infusion as an external application to the eye" (*Assistant Surgeon Nela Sirg, Slatravfur*). "Chiefly used as a condiment and considered to be stomachic" (*Assistant Surgeon Anund Chunder Mockery, Neakhally*). "Antimalicious to a certain extent" (*H. D. Masani, Surgeon, H. M.*).

native, cooling medicine. The seeds is used in cholera. In and sore-throat. It is an in Deccan, Guzerat, and Cutch" (*Bombay, Bhuj, Cutch*). "The known, are powerfully irritant by natives to dog-bites. An infusion made with 4 drams of chillies and a bottle of boiling water has been found useful in severe sore-throat" (*Assistant Surgeon Bhagwan Dass, Rawal Pindi*). "In delirium tremens in 20-grain doses" (*Surgeon-Major George Cumberland Ross, Delhi*). "Is used in liniments as a rubefacient; in cholera pills with camphor and

Food.—The fruit when green is used for pickling and when ripe is found for

FOOD.
454

for daily
curries,
ginger,
poor can

obtain to eat with their rice (*Balfour's Cyclop.*) Dr. Dymock gives the value of Ghâti chillies at Rs 3½ per maund, and Goway, Rs ½ to 4 per maund of 23lb in Bombay.

Capsicum, fastigiatum, Blume. See *C. minimum, Roxb.*

C. frutescens, Linn; Fl. Br. Ind., IV, 239.

SPUR PEPPER, CAYENNE PEPPER, GOAT PEPPER, AND CHILLIES.
THE SHRUBBY CAPSICUM

Ve-

455

Bell Pepper Birds eye Chili.

CAPSICUM
minimum

ana in 1867 in the collection forwarded to the Paris Exhibition (Sims & Co. Trop. Agric. 45)

The pod is dried on a hot plate or in a slow oven and then pounded in a mortar. The powder is then passed through a hand mill and it is brought to the sieve. The residue is then crushed and well sifted and preserved in corked glass bottles for use (Treatise of Botany)

Capsicum grossum, W. B., Fl Br Ind II 239

BELL PEPPER

Vern.—*Asiri mari* & *Bexo* Hind

References.—*Forst.* F. Ind. Ed. C.B.C. 191 *Funk & Hand Pharm.* no. 2452 *Dymock* 1st Ed. II Ind. 2nd Ed. 140 *Praxid* P. 166 *Prod.* 221 *LC Orig. Cult. Pl.* 270 *Balfour Cylop.* 1 *Smith D.* 212 *S. Monnds Trop. Agric.* 49

Hab. tat.—Not much cultivated in India; native place uncertain

Food.—Cultivated to a limited extent in gardens but chiefly for Europeans who either eat this capsicum stems or it is steeped, stuffed with certain species, and pickled in vinegar. The thick fleshy skin is not so hot as that of the other species

464

FOOD
465

C. minimum, Pers. Fl Br Ind, IV 239 Wright, Jc 1 1617

BIRDS EYE CHILLI

Syn.—*C. PAST GIATUM* *Flume*; *C. BACCATUM* *Hall*

Vern.—*Gd h mari* & *Hind*; *Dhanjung ka murich* *lanh morich* *Idl morich* *Bexo*; *Lal mari* & *marich* *Cuj*; *Marich* *lal m rech* *Duk* *Os mulaghat* *TAM*; *Sudm ropo ka* *TEL*; *Chale* *Isadach na* *MAL*; *ka pal melaka* *MALABAR* *Falsurrah* *PERS*; *Filfil* *Wahmar* (red pepper) *ARAB*; *Mris* *Syo*; *Nayd si gna yoke* *gna yoke na* *pmyan* *nayan* *ILAM*

References.—*Knox* Fl Ind. Ed. C.B.C. 191 *101* *Hort. Sub Cal.* 510 *Pharm Ind.* 160 *Funk & Hand Pharm.* no. 452 *U.S. Dispens.* 15th Ed. 300 *Hentl & Trewin Med Pl.* 168 *U.C. Dutt Mat Med Ind.* 221 *Dymock Mat Med II Ind.* 1st Ed. 531 *Haring Bazar Med.* 35 *Biden Lovell Pb Prod.* 363 *Spons En cyclo.* 1803 *Balfour Cylop.* *Smith Dec.* 91 *S. Monnds Trop. Agric.* 490

466

Hab. tat.—Cultivated throughout India but not extensively

1

energetically added to snapshots it greatly increases the reactivity
“Acts as an acrid stimulant and externally as a rubefacient used in

467

C. 468

CARALLIA
integerrima

Small Chillies, Carallia

MEDICINE

putrid sore throat and scarlatina, also in ordinary sore-throat, hoarseness, dyspepsia, and yellow fever, and in diarrhoea occasionally, also in piles' (*Buden Powell*)

Mixture
469

an excellent gargle in the sore throat which accompanies this disease as well as in ordinary relaxed sore-throat, hoarseness, &c" (*Waring, Bear Medicines*)

FOOD
470

Food—This small "chilli" is rarely used by natives, but by Europeans is steeped in vinegar and mixed with salt, in this form it is employed as a seasoning in stews, chops, &c

CARAGANA, Lam, Gen Pl, I, 505

471

Caragana pygmaea, DC, Fl Br Ind., II, 116, Royle, III, t 34, fig 2, LEGUMINOSÆ

Vern—*Tama, dama trāma, LADAK, Shmalak SIND*

References—*Brandis, For Fl, 134, Stewart, Pb Pl, 61, Balfour, Cyclop.*

Habitat—A low shrub very much resembling furze. It inhabits the dry highlands of the Western Himalaya, altitude 8,000 to 17,000 feet

FOOD
Roots.
472
FODDER
473

Fodder—It is browsed by goats and is much valued for fuel in the treeless regions where it is met with. Balfour states that in China the roots of *Caragana flava* are eaten in times of scarcity

CARALLIA, Roxb, Gen Pl, I, 680

474

Carallia integerrima, DC, Fl Br Ind., II, 439, Wight, Ic, t 605, Beddome, Fl Sylv, t CXCVIII, RHIZOPHORÆ

Syn—*C. LUCIDA, Roxb, Fl Ind Ed C B C, 396 Kurz 1, 451*

Vern.—*Kierpa BENG, Jar, KOL, Palamkat NEPAL, Kujitakra ASS, Punschi BOMB, Pansi phansi MAR, Karalli, TEL, And punar, phansi KAN, Damata davelite, SING, Bya ARRACAN, Manesoga, mani-a-g BURM*

References—*Brandis For Fl 219 Gamble, Man Timb, 177, XY Thwaites En Ceylon Pl 120 Dalz & Gibs Bomb Fl 96, Voigt, Hort Sub Cal, 42, Royle, Ill Him Bot, I, 210, Lisboa, U Pl, Bomb 73, Balfour, Cyclop*

Habitat—An evergreen tree with thin, dark grey bark, found in the Eastern and Western moist zones, particularly in the Eastern Himalaya, Bengal, Burma, South India, the Andaman Islands and Ceylon

TIMBER
475

Structure of the Wood—Sapwood perishable, heartwood red very hard, durable, works and polishes well, weight from 42 to 51 lb per cub c

(*Beddome*)

C. 475

The Monkey's Horn; Carapa.

CARAPA
moluccensis.CARALLUMA, *R. Br., Gen Pl., II., 782*

Fleshy, erect nearly leafless herbs, with very thick subterrene or angular stems. The generic Caralluma is said to be derived from a South Indian vernacular name.

Caralluma adscendens, *Br.; Fl. Br. Ind., IV., 76*; ASCLEPIADACEÆ 476

Vern.—*Chala malayan*, TAM

References.—*Burser, Fl. and Drugs, Sind, 1st 2, Balfour, Cyclop*

Habitat.—Met with in arid places in the Dekkan Peninsula

Food.—This fleshy plant is often eaten by the Natives in the form of pickles, or is made into a utney. FOOD 477

C. edulis, *Burm. Fl. Br. Ind., IV., 76* 478

Syn.—*Holceresia edulis*, *Edce*

Vern.—*Chang, chhang p'ing, p'ing, p'ing, sidda, sidda, sidda gandhal*, PA

References.—*Burm., Fl. Br. Ind., 1825; Adkinson, Cat., Pl. Fl., 80; Burser, Fl. and Drugs, Sind, 1st 2; Baden Powell, Pl. Br., 2nd 4, Balfour, Cyclop*

Habitat.—Found in the arid tracts of the Punjab and Sind

FOOD
479

C. fimbriata, *Wall.; Fl. Br. Ind., IV., 77* 480

MONKEY'S HORN

Vern.—*Matar-ning*, BOMB

References.—*Dal., & Gibs, Bomb Fl., 155; Voigt, Hort Sub Cat., 535; Lisboa, U. Pl., Bomb., 155*

Habitat.—Met with in arid rocky places of the Dekkan Peninsula, from the Konkan southwards, and also in the Ava district of Burma.

Food.—In the Bombay Presidency the plant is eaten as a vegetable. FOOD. 481

Carambola. See *Averrhoa Carambola*, *Linn., GERANIACEÆ*

CARAPA, *Aubl., Gen Pl., 338*

Carapa moluccensis, *Lam., Fl. Br. Ind., I., 567. Bedd., Fl. Sylv., I., 136. MELIACEÆ* 482

Syn.—*C. OBOVATA*, *Bl. (Aurp., 1, 226)*; *XYLOCARPUS GRANATUM*, *Koen*

Vern.—*Poshur, pussur, BENG Kandalanga, TAM Pinloyo ing, pinl*

...

Habitat.—A moderate sized evergreen tree of the coasts of Bengal, Malacca, Borneo, and Celebes

for burning purposes

semi-solid fat This
as a hair-oil, and also

GUM
483
OIL
484

C. 484

Indian Lime.

CARBONATE OF LIME.

*Eddā, churra, samāla-thāsmā, karāḍa-thāsmā, suḷi-thāsmā, sam
būḍa-thāsmā, SING, Kālī ahu ARAB, Arabah ahu, PERS; Hānnā,
AHM, SING, Thā-m-phān BURM; Kaper, MALAY*

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.

*CHALK - Kāḍa-mān HIND, PR; Kāḍa-mān, BENG; Vidyāti-
chūna, MAR, Chāt vīḍa-chūna, GUJ; Vidyāti-chūna, DUK; Shi-
mā, shānnamā, TAN; Shima-mān, TEL; Shimamāra, MALAY;
Shima-mān, KAN; Kāḍa-mān, SING; Mā-phān or mē-diyu, thau-
lūm BURM*

*UNSLAKED LIME - Kālī-kāḍa, HIND, Kar-chūnnamā, TAN;
Kālī-mān, TEL*

References - Page, Hand-book of Geology, &c., Dana, Manual of

*The further Bibliography of Lime, Limestone, Marble, and Kunkur
will be found in Hall's Economic Geology, pp 625, 627.*

and not readily obtainable. Lime is also intimately associated with many industries, and plays a distinct part in the manufactures which fall fairly within the scope of the present work. It has therefore been thought desirable to give a brief abstract of the available information regarding Lime, Limestone, and Marble. See MARBLE.

Marble.

producing the colouring and veining, and from the presence of imbedded shells, corals, or other organisms (See Marble).

the eye
of the e
muriat
vert it into quicklime

Limestone.

Chalk.

dissolves readily in dilute muriatic acid, and gives no precipitate with the addition of ammonia water.

CARBONATE OF LIME.

Indian Lime

Lime.

IV. LIME is an oxide before being slaked with water to its corrosive property. OF LIME deprived of its into CALCIUM HYDRATE (CaH_2O_2) which on being mixed with sand forms mortar or cement "As an earth, lime is properly disseminated in nature, as a rock, it enters largely into the composition of the earth's crust, it is less or more diffused in all its waters, it forms the principal ingredient (earth of bone) in the skeletons of the larger animals, and is secreted by many classes of the invertebrates to form their shells, crusts, shields, corals, and other means of protection Economically it is also of vast importance, being used in the manufacture of mortars and cements, in tanning, bleaching, deodorising, and the like, and also in agriculture as a fertiliser or promoter of vegetable decays" (Page)

FORMS OF LIME USED IN INDIA

There are three kinds of lime used in India (a) lime prepared from limestone, (b) lime found on the surface of the ground and known as *kankar*, and (c) lime prepared from fresh-water or marine shells,

(a) LIME FROM LIMESTONE

Speaking of the distribution of limestone and marble, Mr Ball in his "Economic Geology" says "Limestones can hardly be said to be absent from any of the formations in India, though in some they are either rare or so impure as hardly to deserve the title In the metamorphic series, bands of crystalline limestones occur locally in some abundance,

found in the Bhaner group, where they sometimes attain as great a thickness as 260 feet, and are used both as a building stone and for lime

"In the Gondwana series, limestones are rarely met with, and then chiefly in the Talchir and Raniganj groups, where they occur as lenticular or concretionary masses

"In the rocks of cretaceous age, within the peninsula, limestones of both sedimentary and coral reef origin occur The other sources of lime are principally sub recent and recent tufaceous deposits of *kankar*, travertine, &c

"In the extra peninsular regions the principal formations containing limestones are of carboniferous, jurassic cretaceous, and nummulitic ages Another source of lime is recent coral On the whole it

LIMESTONE
490rk, a de-
to prov-hinopoly,
open ng

491

C. 491

Indian Lime

CARBONATE OF LIME

of the railways, have largely replaced the <i>kunkir</i> formerly employed for building purposes in the Presidency	LIMESTONE
<i>In Bengal</i> , although of India, workable stone supplies are practically and Lohardaga. In the peculiar interest because of their proximity to iron ore	492
<i>In the Central Provinces</i> , limestones occur at Sambalpur, Raipur, and Jabalpur, the latter consisting of the famous marble rocks of that name. Limestones also occur throughout the Vindhya range, the most accessible being in the neighbourhood of Warora. At Raipur a stone suitable for lithography has been found	493
<i>In Kutch</i> , limestones of different ages are met with, but those most esteemed belong to the lower Jurassic group	494
<i>In Southern Afghanistan</i> limestones of cretaceous age abound, and in Baluchistan nummulitic limestones are found in the eastern frontier as well as in Northern Afghanistan. In the latter the Safed Sang takes its name from a beautiful Statuary marble	495
<i>In the Punjab</i> , marbles and limestones in considerable variety and from different geological formations are met with	496
<i>In the North-West Provinces</i> and along the Tarai to Darjiling limestones are not infrequent. An account of these may be found in Atkinson's <i>Report on the Geology of the North-West Provinces</i> . Mallet speaks of <i>Hima Tal</i> , at Bageswar and Almora, at Baitalghat, and Dhikuli for <i>magar</i> . Lime is also made at <i>Two kinds of limestone</i>	497
are used in the Tarai for the foot of the Kur the other is the tufa this latter kind, however, stone costs at the quarry by the Forest Department averaged at half a rupee per maund for a 100 maunds. Thus the stone is landed at most points in the district for Rs 30 per 100 maunds and including the expense of burning, a maund of lime costs 10 to 12 annas. This lime will bear two or three portions of pounded brick or <i>sarkis</i> . Second class lime ready for use now costs Rs 25 and delivered in Nainital Rs 50 to Rs 100 per 100 maunds, it will, however, only bear a proportion of one part of pounded brick to two parts of lime.	
<i>In Central India</i> at Gwahar an abundant supply of flaggy limestones occurs	498
<i>In Rajputana</i> the Arvali group of transition rocks includes many varieties of marble, some of them being of great beauty. The Jhirri quarries of Alwar afford hard white marble. Black marble is met with at Mandla, near Ramghur, white as well as pink and grey marbles at Raigarh in Taipur. But the most extensive marble quarries of Rajputana are at Makrana in Jodhpur. This marble has been celebrated for ages, the Taj of Agra being built of it.	499
<i>In Bombay</i> , there are numerous localities where limestone occurs but no marble. In the Panch Mehals, good building limestones are obtained but not hydraulic, and in Guzerat more or less calcareous rocks are met with	500

Indian Lime

CARBONATE OF LIME.

(b) KANKAR OR CONCRETIONARY LIME.

KANKAR.
509

KANKAR (KUNKUR).—"Throughout the plains of Upper India the principal source of lime is the *kankar* which is found in nodules and layers of various sizes in the clays of the Gangetic alluvium. It yields an excellent but somewhat hydraulic lime" (*H. B. Medlicott. See also the remarks under Limestone.*)

"*kankar*" (which really means any kind
1 for concretionary carbonate of lime,

and externally of a mixture of carbonate of lime and clay. The more massive forms are a variety of calcareous tufa, which sometimes forms thick beds in the alluvium, and frequently fills cracks in the alluvial deposits or in older rocks

"In the beds of streams immense masses of calcareous tufa are often found, forming the matrix of a conglomerate, of which the pebbles are derived from the rocks brought down by the stream. There can be no

"As a flux for iron, *kankar* has been tried on several occasions, and opinions are somewhat divided as to its applicability to the purpose; but owing to the uncertainty of its composition, it is distinctly less well adapted than rock limestones which have a well-defined average composition, even though in the latter the proportion of carbonate of lime may average something less.

"Block *kankar* has been largely employed as a building-stone, more particularly in connection with the Ganges Canal Works" (*Ball*)

Most of the roads in Northern India, and indeed in India generally, are metalled with *kankar*.

510

(c) SHELL-LIME.

SHELLS.—Ainslie, in his *Materia Indica*, mentions lime produced by burning the sea-shells, called in Tamil *kullingie chunambu*. Dr. U. G.

SHELL-LIME.
511

CARBONATE OF LIME.

Indian Lime

SHELL-LIME.

that I have visited by burning the shells of the genus *OSTREA*, which
abo
in a

aba
globosa.

LIME ESSENTIAL TO VEGETATION.

AGRICUL-
TURAL USES
512INDUSTRIAL
USES.

Dye—Lime is universally used by the Mánipuris to assist in the transformation of green into blue indigo and to deepen the blue colour of indigo, and a small piece placed in the mouth of a vessel containing indigo is also supposed to preserve the dye (See *Strobilanthes*). Lime is employed in the Rajshahye district for dyeing thread dark blue, of this

Dye adjunct
513Calico
printing
514

Tans of the North-West Provinces, gives a preparation of blue printing ink of permanent colour. A mixture of 4lb of shell-lime, 10lb of stone lime, and 15lb of impure carbonate of soda (*ref*), with 3 gallons of water, is strained through grass, to this is added 1lb of sulphurate of arsenic and 1lb of indigo, the mixture is then boiled "till it assumes the metallic greenish blue lustre of the peacock's tail. It is then thickened with *babul* gum and is then ready for printing." Sir Edward further remarks

A paint
515Tanning
516

Indian Lime.

CARBONATE OF LIME.

MEDICINAL USES

Medicine—According to Dutt, in the *Hindū Materia Medica* (p 82) lime is used internally in dyspepsia, enlarged spleen, and other enlargements in the abdomen, and externally as a caustic. A mixture of lime, carbonate of soda, sulphate of copper and borax, is applied as a caustic to tumours and warts. It enters into the composition of several prescriptions for different forms of dyspepsia, such as *Amrita vati* and *Agastikumara rasa*.

Ainslie says the Vytians prescribe lime water mixed with gingelly oil and sugar in obstinate cases of gonorrhœa. "Mixed with gamboge, quicklime is applied externally to prurful and gouty limbs. It is also used as a caustic in the bites of rabid dogs" (*S Arjun, Bomb. Drugs*). The exhaustive account of the medicinal properties of lime given by Dr. Waring in his *Bazar Medicines* (p 85) may be here quoted, since by doing so it will practically be unnecessary to refer to other authors —

MEDICINE.
517

518

lime is deposited at the bottom. In cases of emergency, as burns, &c., half an hour is sufficient for this purpose, otherwise it should be allowed to stand for twelve hours at least before being used. It is only the clear water which holds a portion of lime in solution, which is employed in me-

milk,

519

The dose of the clear water is from 15 to 20 drops or minimis in milk, twice or thrice daily.

"In acidity of the stomach, in heart-burn, and in those forms of in-

is best given in milk.

"In diarrhœa arising from acidity, lime water frequently proves useful; it is best given in a solution of gum arabic or other mucilage, and in obstinate cases 10 drops of laudanum with each dose increase its efficacy; it may also be advantageously combined with Omun water. In chronic dysentery the same treatment sometimes proves useful. Enemas

trial in the vomiting attendant on the advanced stages of fever; it has

C. 519

CARBONATE OF LIME.

Indian Lime.

MEDICINE.

been thought to arrest even the black vomit of yellow fever. It is also a

520

charges have in some instances been mitigated and even cured by the use of vaginal injections of a mixture of 1 part of lime water and 2 or 3 of water

"In scrofula, lime water in doses of $\frac{1}{2}$ ounce in milk, three or four times a day, proves beneficial in some cases, it is thought to be especially adapted for those cases in which abscesses and ulcers are continually forming To be of service, it requires to be persevered in for some time. Scrofulous and other *For syphilitic ulcers or chancre* water $\frac{1}{2}$ pint and *camellia* 30 grains, uns, commonly known as black

water either pure or combined with oil to sore or cracked nipples it proves very serviceable Diluted with an equal part of water or milk, it forms a useful injection in discharges from the nose and ears occurring in scrofulous and other children

"In Consumption, lime water and milk has been strongly recommended as an ordinary beverage The same diet-drink has been advised in Diabetes, but little dependence is to be placed upon it as a cure, it may produce temporary benefit

or

ful

of

521

effective in preventing a rising in small pox.

LIME AS A CONDIMENT

FOOD
In pan.
522

523

alluding to the use of lime in *pan*, says, "when used for any lengthened period, it considerably modifies the natural condition of the mucous covering of the mouth, and alters the appearance of the tongue so as to render it useless or fallacious as a means of diagnosis in disease Its use in moderate quantities does not appear to act prejudicially on the system, but when largely indulged in, it lays the foundation of much visceral disease."

C. 523

Indian Lime

CARBONATE OF LIME.

DOMESTIC AND OTHER USES

Manure.—As a manure, lime plays an important part. It is largely

DOMESTIC.
Manure
524

are not so diversified as is desirable. A dressing from 1,000 to 5,000 lb of lime may be applied per acre, according to the price at which the lime can be obtained' (H. R. Robertson, *Agriculture*, 13)

Lime is often employed as a deodorising agent. "It is mixed with decaying vegetable matter and with animal bodies, with the view of hastening their destruction and preventing the escape of offensive and noxious effluvia. This effect lime produces by its tendency, in common with the other caustic alkalis, to carry the decomposition through the intermediate stages of putrefaction at once to the ultimate products" (Morton, *Cyclop., Agriculture*, Vol II, 266)

Soap.—Lime is used in preparing soap according to Lunge's method, which is described thus: "A flat-bottomed pan is preferred for making this soap, into which is introduced any given quantity of water and slaked lime equal to 12 per cent of the weight of fatty matter. The whole is to be boiled and stirred when an insoluble hard lime soap and a solution of glycerine are produced, when the latter may be drawn off from the bottom of the pan. A certain quantity of water and commercial carbonate of soda (the latter being slightly in excess of the quantity of lime used) are next added, and the boiling and stirring continued, when the hard carbonate flakes on sufficient the separ. important

Soap.
525

Mortar and Cement.—The use of lime in the preparation of mortars and cements is too well known to require any special description. The following paragraph from *Miller's Chemistry*, Part II, 462, is, however, quoted here, as it will be found instructive: "The great consumption of lime in the arts is for the purpose of making mortars and cements. Pure lime, when made into a paste with water, forms a somewhat plastic mass which sets into a solid as it dries, but gradually cracks and falls to pieces. It does not possess sufficient cohesion to be used alone as a mortar, to remedy this defect and to prevent the shrinking of the mass, the addition of sand is found to be necessary."

Cement.
526

burnt lime, a suitable quantity of water is afterwards worked into it, and it is then applied in a thin layer to the surfaces of the stones and bricks which are to be united. The bricks or stones are moistened with water before applying the mortar, in order that they may not absorb the water from the mortar too rapidly. The completeness of the subsequent hardening of the mortar depends mainly upon the thorough intermixture of the lime and sand."

CARBONATE OF POTASH.

Sources of,

the feet, now employ for *sarkhs* grinding steam power to drive heavy rollers which work in a strong iron basin. For further information see Cement.

527

Carbonate of Potash.

POTASHES, PEARL-ASH; CARBONATE DE POTASSE, *Fr.*; KOH-LENSAUERES KALI, *German*

Vern — *Saryka*, *BENO*, *Yon khar*, *swak chhar* or *ouk chhar*, *HIND*;

Repons Encyclop, p. 253, *Balfour's Cyclop*

The mon-oxide of the metal Potassium is known commercially as

Potashes
528
Pearl-ash,
529
Cont. with A
759.)

rapidly absorbs moisture if exposed to the atmosphere, forming thereby a thick oily liquid known as *Oleum tartari per deliquium*. If subjected to dry heat it melts at 800°, but loses a portion of its carbonic acid at still higher temperatures. And decomposes at a higher temperature.

Source of carbonate of po-
At the same time

aceous annuals contain more pearl-ash than woody arborescent plants but even of the same plant the succulent young parts are more highly charged than mature tissues. Of different plants pines contain on an average only 0.45 per cent, oaks 0.75 to 1.5 per cent, vine shoots 5.50, ordinary straw 5.8, ferns from 4.25 to 6.26, Indian corn stalks 17.5, nettles 25.03, wheat straw before earing 4.10, wormwood 73.0, and beet about the same amount.

These facts naturally suggest the plants best suited for the preparation of pearl-ash and the —

Indian Manufacture of

CARBONATE OF POTASH.

clarified and the crystallizable sugar extracted, the remaining liquor is permitted to ferment, that the uncrystallizable sugar may be turned into alcohol and so utilized, but in the stills there will yet remain a waste liquor, and it is in this that abundance of potash salts occur. By evaporating this liquor in a long trough divided across into an evaporating and a calcining section, a salt is finally obtained, consisting of a mixture of potassium chloride, sulphate, and carbonate (together 50 or 60 per cent) with insoluble matter and a good deal of sodium carbonate. The potassium carbonate forms about one-third of the weight of the calcined mass, and arises in a great measure from the destruction, during the calcining process, of the potassium oxalate, tartrate, and nitrate which occur naturally in the beetroot, and, consequently, in the liquor from the still" (*Prof Church in British Manuf Ind.*) This instructive account of the extraction of carbonate of potash from the waste of beet-root has been reproduced here because of its direct bearing on many of the native contrivances employed in India for the preparation of pearlash. It would be almost impossible to over-estimate the extent to which a crude carbonate of potash is employed by the people of India. In another volume under Alkaline Ashes (A. 758, also A. 1626) will be found an enumeration of the principal plants used by the natives of India for that purpose, and these should be compared with the plants given under Berilla (B. 163) as employed in the manufacture of carbonate of soda. Although in India immense tracts of mountainous land are injuriously covered with various species of wormwood (see *Artemisia*), except as a manure, the ashes of these plants are not apparently utilized. From the high percentage of carbonate of potash which the wormwoods contain, the preparation of pearlash might be confidently recommended to the poorer inhabitants of these regions as a useful new industry. A large export trade might reasonably be anticipated from the Himálayas to the plains of India, if not to foreign countries.

While this is possible, an equally profitable industry might also be organised in preparing the carbonate from the injurious amount of saltpetre

SOURCES OF

Wormwood
Ash.
530

The
Carbonate
from
Saltpetre.
531
from the

... .. Rectification of spirit, Bleaching, and in

Turkey-red
Dyeing.
537
Rectification
of Spirit
538
Bleaching.
539

CARBUNCLE.

Carbonate of Soda: Carbuncle.

CARBONATE
OF POTASH.

wood on the hills and from saltpetre on the plains seems, therefore, worthy of consideration

Yearly Production.—The world's annual production is about one million hundredweights

MEDICINE
540

Medicine.—Carbonate of potash is antacid, then alterative and diuretic, and in over doses poisonous. It is described in Hindu works on medicine "as stomachic, laxative, diuretic. It is used in urinary diseases, dys-

emucous remedy (U C Dutt, *Alas Alea 1111a*, 6/)

Special Opinions.—§ "An impure carbonate of potash (*papāda khara*) is also sold in the Bombay bazārs, and is used in the preparation of *papada* (*papun*), or little cakes made with the meal of the different sorts of *dhall* and a little quantity of *asafoetida*, these are given as a digestive, but more as an article of food than medicine, the cakes are roasted over the fire and taken with rice" (C T Peters, *M B*, *Zandra*, *South Afghanistan*)

For further information see ALKALINE EARTHS, BARILLA, POTASH, REH and SALTPETRE

541

Carbonate of Soda.

Vern.—*Sajji*, *sajji-mitti*, *sajji khar*, HIND, *Sajji*, BENG, *Chour khamatti*, *chour khamak* DUK, *Sajjekhara* MAR, *Shach chi karam*, TAM, *Lota sach chi* TEL, *Qili*, *milhui-qili*, ARAB, *Shikhar*, *tine-gasur*, PERS, *Sarjikkshara*, SANS

References.—*Pharm Ind*, 322, *S Arjun*, *Bomb Drugs*, 160, 161, *U. S Dispens*, 1321, *Ure*, *Dict of Arts and Manufactures*, 854.

MEDICINE.
542

Medicine.—A substance too well known to require any special description (See remarks under the preceding and under BARILLA, SAJJI, and REH) It is antacid and then alterative "A paste made of equal parts of *yavakshira* and *sajji kakshara* with water is applied to abscesses for the purpose of opening them" (U C Dutt)

Special Opinions.—§ "Carbonate of soda (impure), *bangada khara*, being the residue left during the manufacture of glass bangles. A second form, which appears to be a purer carbonate of soda, is called *Surati khara*, both are used in the treatment of dyspepsia" (C. T Peters, *M B*, *Zandra*, *South Afghanistan*).

CARBUNCLE.

543

Carbuncle.

"The Carbuncle of the ancients is garnet cut, as it is called, *en cabuchon*. The art is still practised in India, and the stones, when of good

Calcutta.
544
South India.
545
Bombay.
546
Burma.
547

The garnet when cut as a Carbuncle is convex above and hollowed out below, so as to leave but a thin layer of the stone through which the light passes, revealing the bright colour. The finest carbuncles are said to come from Pegu and Ceylon. Conf. with Carnelian.

C. 547

Heart Pea or Winter Cherry.

CARDIOSPERMUM
Halicacabum

CARCHARIAS, Muller and Henle, Day, Fishes of India, 710

548

Carcharias.—Several species of sharks are employed by the natives of India in the preparation of a medicinal oil. It seems probable that the sharks specially selected for that purpose belong to the genus *Carcharias*. Of these *C. gangeticus* is the most ferocious. It ascends the rivers to about the limits of the tidal influence. *C. hemodon* also goes up the rivers specimens having been caught near Calcutta. Several other species are frequent in the Red Sea and Indian Ocean, particularly on the coast of Sind. (See SHARKS AND SHARK FINS.)

CARDAMINE, Linn., Gen Pl., I., 70

Cardamine hirsuta, Linn., Fl Br Ind, I., 138, CRUCIFERÆ

549

References—*Thrautes* Fr Ceylon Pl., 14, Dals & Gids, Bomb Pl., 7, Stewart, Pb Pl., 13, Treasury of Botany

Habitat.—A herb found in all the temperate regions of India, very abundant in Bengal during the cold weather

Food.—The leaves and flowers constitute an agreeable salad, resembling water-cress

FOOD.
550

Cardamom, see *Amomum subulatum*, Roxb.—the Greater Cardamom, and *Elettaria Cardamomum*, Maton—the Lesser Cardamom

Cardamom seed oil, see *Amomum subulatum*, Roxb

CARDIOSPERMUM, Linn., Gen Pl., I., 393

Cardiospermum Halicacabum, Linn., Fl Br Ind, I., 670, Wight, Ic, t 508, SAPINDACEÆ

551

BALLOON VINE, HEART PEA OR WINTER CHERRY

Vern. *Lataphathari*, *nayaphathi*, *noaphuthi* *siyhal*, BENG., *Hal ul kahal* (seed) PB., *Karolo* GUJ., *Kanpluti* *bodha*, *siyhal* BOMB., TEL., *Mala*

t, II,
Dutt,
lymo k,
Arjun
Irea
tason z

Habitat.—A climbing herbaceous plant plentiful in the plains of India, chiefly in Bengal and the North West Provinces, is distributed to Ceylon and Malacca. Tendrils are modifications of portions of the flower bud fruit triquetrous inflated

Medicine.—The root is used in medicine as an emetic, laxative, stomachic, and rubefacient. Tonic properties.

MEDICINE
Root.
552

"It is used as a

C. 553

CAREYA.

The Thistle.

MEDICINE.

Leaves

554

tonic in fever, and a diaphoretic in rheumatism" The dried LEAVES are said to bring on the secretion of the menses The following prescription is given by Dr Dutt as a Hindu cure for amenorrhœa Equal parts of *Jyautishmati* leaves, *sarsakā* (impure carbonate of potash), *Acorus Calamus* root (*vacha*), and the root-bark of *Terminalia tomentosa* (*asana*) reduced to a paste with milk, taken in doses of about a drachm for three days (*Mat Med Hindus*) "On the Malabar coast the leaves are

Plant.

555

ith castor oil, are inter-
Mixed with jaggery and
es The whole PLANT,
body in bilious affec-
it is applied to rheu-
matism and stiffness of the limbs The plant, steeped in milk, has

Juice.

556

Dutt, Drury, S Arjun)

FOOD.

Leaves.

557

Seeds.

558

Food—"In the Moluccas the LEAVES are cooked as a vegetable"

CARDUUS, Linn, Gen Pl, II, 467.

559

Carduus nutans, Linn; *Fl. Br. Ind*, III, 361; COMPOSITEÆ

THE THISTLE

Vern—*Kanchari*, *tiso*, *bādaward*, Ps, *Guli bādawurd*, KASHMIR

References—*Stewart*, Pb Pl, 123. *Baden Powell*, Pb Pr, 356, *Dymock*, *Mat Med W Ind*, 396, also 2nd Ed, 496

Habitat—A tall stout thistle, found in the Western Himalaya, from Kashmir to Sinala, at an altitude of 6,000 to 12,000 feet, also at Hazara in the Panjab, and in Western Tibet, at an altitude of 13,000 feet.

MEDICINE.

Flowers.

560

FODDER

561

DOMESTIC

562

for *Cratægus*)

Domestic.—Murray remarks that the leaves are employed to curdle milk.

CAREYA, Roxb., Gen. Pl, I., 721

num.
inne
ann
num
numerous

merous *Stamens*
filaments filiform,
d, crowned by an
absorbed, seeds

A genus, containing only 3 species and these confined to India, named in honour of the Rev. Dr Carey—one of the distinguished Serampore Missionaries—a distinguished botanist and a contemporary of Dr. Roxburgh's

C.562

Careya.

CAREYA
arborea

Careya arborea, Roxb, *Fl Br Ind*, II, 511; *Bedd*, *Fl. Sylv*, I, 205, *Wight Ill*, 99, 100, MYRTACEÆ

563

Ve—

References—*Roxb*, *Fl Ind*, Ed C B C, 447, *Dale and Gils*, *Bom Fl*, 95, *Brandis*, *For Fl*, 136, *Kurz*, *For Fl*, *Burm*, I, 499, *Gamble*, *Man*, *Timb*, 197, *Thwaites*, *Eu*, *Ceylon Pl*, 119, *Stewart*, *Pb Pl*, 95, *Drugs*, 55, *Baden*, *Report on Econ Prod*, any, *Dale & Gils*, *Gums and Resins*.

11

W. H. S. — A large dried ...

Gum.—Yields a brown or greenish brown gum, regarding which but little is known (*Atkinson*). This forms with water a tolerably thick mucilage of a dark brown colour (*Dymock*).

GUM
564

Dye and Tan.—Bark used for tanning (*Kurz*). The Rev A Campbell says that in Manbhum the bark is used as a dye.

TAN.
Bark.
565

Fibre.—The bark yields a good fibre for coarse cordage. (*Gamble*, *Campbell*, &c). Lisboa remarks that the bark affords a 'stuff suitable for brown paper of good quality.' Tasar silkworms feed on the leaves (*C P Gaz*, 1870, 504).

DYE.
Bark.
566
FIBRE.
Bark.
567

Medicine.—The bark is given internally.

Paper
making.
568

Campbell, *Manbhum* child birth. They heal ruptures caused by the CALICES of

MEDICINE.
Bark.
569

kumbha, they are clove shaped, 4-partite fleshy, of a greenish-brown

Infusion
570
Flowers.571
Juice.572
Fruit

573

FOOD
Seed574
Fruit.575
Seeds.

576

DUMU 1718, 551

Food.—The tree blossoms during the hot season, the seed ripening about three or four months after (*Roxb*). The Rev A Campbell says the fruit is eaten by the Santals, and is also used medicinally, as are the flowers. The fruit, known as *khum*, is eaten in the Panjab, it is also given to cattle. The seeds are said to be more or less poisonous.

C. 576

CARICA
Papaya

The Papaya or Papaw

TIMBER.
577

Stems of the Wood — Smooth, light brown, heart and dull red, , beauti-
ght from
brought
Mishmi
being cut

Drury says "the cabinet-makers of Monghur use the wood for boxes. It takes a polish, is of a mahogany colour, well veined." It is being tried for railway sleepers on the Eastern Bengal and Northern Bengal State Railways, but the results of the experiment are not yet known. Kurz remarks that it is used in Burma for gun stocks, house-posts, planking, carts, furniture, and cabinet-work but is too heavy for such purposes. It stands well under water and is much admired for axles. "It is frequently em-

DOMESTIC
Slow-match
578Tinder
579

ing salinity (Durum Gas, 1, 129). The timber was formerly used for making the drums of sepoy corps" (Drury, U Pl)

580

Careya herbacea, Roxb, Fl Br Ind, II, 510; Wight, Ic, t 557

Vern — *Bhus dalim*, BENG, *Chuma*, NEPAL, *Bhumi darimba* SANS

References — Brandis, For Fl, 237, Kurz, For Fl, I, 499 Gamble, Man Timb, 197

Habitat — A small undershrub with pink flowers which appear from February to March. Common in the Tarai from Kumaon to the Kha Hills and Chittagong. Also plentiful throughout the plains of Bengal, Oudh, and the Central Provinces

CARICA, Linn; Gen Pl, I, 815

581

Carica Papaya, L, Fl Br Ind, II, 599, PASSIFLOREÆ

THE PAPAWE OR PAPAWE TREE

Vern — " " " " " "

Asi asi-du, COCHIN CHINA

References — Roxb, Fl Ind, Ed C B C, 736 Brandis, For Fl, 234, Kurz For Fl Br Ind, I, 499 Gamble, Man Timb, 197

The Papaya or Papaw.

CARICA
Papaya.

Habitat.—A sub-herbaceous, almost branchless tree, commonly cultivated in gardens throughout India; from Delhi to Ceylon. Fruits all the

by the modern Indian names being evidently derived from the American word *papaya*, itself a corruption of the Carib *ababai*. Ainslie says it is a native of both Indies, an opinion held by many popular writers, but not supported by modern botanists. Atkinson regards it as introduced into India by the Portuguese. Brandis tells us that its Burmese name, *thimbawthi*, means fruit brought by sea-going vessels. In 1626, seeds were sent from India to Naples, so that the tree must have been introduced into India at an early date or shortly after the discovery of America. It is generally dioecious, the female flowers sessile, and the male on long peduncles. Sometimes, however, it is monœcious or the flowers even hermaphrodite.

Resin.—Exudes a white resin (*Kurs*).

Fibre.—Dr Dymock recommends the fibre from the stem to be examined.

RESIN.
582
FIBRE.
583
MEDICINE.
Jules.

with 150 gr. of. Great public recognition support of its anæsthetic virtues. Further confirmatory evidence has more recently been added by M. Bouton (*Med. Plants of Mauritius*, 1857, p. 65), and it may justly be con-

quired. The above is a dose for an adult; half the quantity may be given to children between seven and ten years of age, and a third, or a tea-spoonful, to children under three years. If it cause griping, as it occasionally does, enemata containing sugar have been found effectual in relieving it. Taking the dose above named as correct, the statement of Sir W. O'Shaughnessy (*Bengal Disp.*, p. 352) that he had prescribed the

CARICA
Papaya.

MEDICINE.

Juice useful
in Lumbrici.
Seeds.

586

Useful as an
Emmena-
gogue.

The Papaya or Papaw.

milky juice as an anthelmintic, in doses from 20 to 60 drops, without obvious effect, is fully explained. It is principally effectual in the ex-

that they assert that if a pregnant woman partake of them, even in moderate quantities, abortion will be the probable result. This popular belief is noticed in many of the reports received from India. In them it is also stated that the milky juice of the plant is applied locally to the os uteri with the view of inducing abortion' (*Pharm. Ind.*, pp 97, 98)

The opinions so liberally contributed for this publication, by the Indian medical officers (see below), give so much of personal experience regarding the properties of this drug that it is scarcely necessary to abstract an account of it from the publications usually consulted. The following passages may, however, be found useful

A writer in the *Ceylon Observer* (30th July 1884) says: "Papain," papainum, or vegetable pepsin, may be prepared from the juice of the green fruit of *Carica Papaya* by adding alcohol, which precipitates papain. This precipitate is dried and powdered and is then quite ready for use. Brunton considers that, in its peptonising powers, it is superior to the ordinary animal pepsin, and it has the additional advantage of neither requiring the addition of an acid nor an alkali to convert the contents of the stomach into peptone. It has been used in France, and Germany, and has been is an invaluable remedy in the

The author of *Makela* mentions it as a remedy for hemorrhoids

b
p
(
h
r
d

Mat Med)

Leaves

587

The Papaya or Papaw.

CARICA
Papaya.

believed to be the cause of disease Firminger (*Van Gard, Ind.*) says that the tree comes into flower during the rains and emits at times a fine fragrance

CHEMISTRY.
588

larger particles and contained a fine grumous mass containing some juice yellowish brown, 10 times its weight of lean beef in or Below

the boiling put into several pieces, and at the close of the experiment it had separated into coarse shreds In the control experiments made without the juice the boiled meat was visibly harder. Hard boiled albumen, digested with a little juice at a temperature of 20° C, could after twenty-four hours be easily broken up with a glass rod 50 grammes of beef in one piece, enveloped in a leaf of C Papaya during 24 hours at 15°C after a short boiling became perfectly tender, a similar piece wrapped in paper and heated in the same manner was hard Some comparison

the following are the results

(1) The milky juice of the papaya is (or contains) a ferment which has an extraordinarily energetic action upon nitrogenous substances and like none other

1878) The active principle has since been separated and given the name of *Papaine*, it is now an article of commerce in Europe for medicinal purposes and is said to be capable of digesting 200 times its weight of fibrine, it has been used as a solvent of diphtheritic false old standing cases of chronic the hands, and where other re-application in the following cases of no danger here

MEDICAL
OPINIONS

Gastritis, with great benefit, I had at the grounds of Bankura jail and the milky juice collected 24 hours or so, a dull white preparation for internal use,

CARICA
Papaya.

The Papaya or Papaw.

MEDICAL
OPINIONS

uld be given to adults
it quite tender and fit
the case of invalids

A mixture of the juice does not keep well and is disagreeable to taste. A syrup of the powder may be made if required for children and delicate women" (*Surgeon R L Dutt, M D., Poona*) "The milk-like juice of the green or unripe fruit is a good digestive, and most efficacious in dyspepsia. I have frequently prescribed it with marked success. The ripe fruit is alterative, and if eaten regularly every morning, corrects that habitual constipation so common in India. The dry fruit is said to reduce enlarged spleen, but I administered it in several cases without any apparent benefit. The leaves are reputed to promote the secretion of milk. I tried this, and the result was not unfavourable, but I think the good effect was chiefly owing to the maintenance of a uniform heat. However, more experiments are necessary to decide the question. The leaves should be gently bruised and heated in a pan and applied warm to the breast. The dose of the milk like juice is 30 drops, mixed with water, two or three times a day. The juice must be fresh, as it decomposes quickly, but it may be obtained by picking the green fruit on the tree and collecting the
Civil Surgeon, Dumka,

and then cooked, it will be as tender

I have seen spleen grow smaller in young persons who have been treated with the dried and salted fruit. The juice called *papaine* has digestive ferment properties and will remove thickened skin, as in eczema and corns. It is also said to be a

R. Gray, Lahore) "It has the property of rendering meat tender and of facilitating the process of cooking. It contains a vegetable peptine and can be used as *"meat tenderer"* (Dr. J. C. S. "The Medical Dictionary")
Monghiar) "meat, it dissolves
meat renders
mild laxative

The milky juice of the unripe fruit is said to possess digestive

CARICA
Papaya.

The Papaya or Papaw.

MEDICAL
OPINIONS.

other methods were used the matter is open to doubt" (*Surgeon W. G. King, M B., Madras*) "The leaves are used externally for nervous pains. The leaf may be either dipped in hot water or warmed over a fire and applied to the painful part" (*Surgeon-Major W. Nolan, M D, Bombay*) "The seeds are considered to be anthelmintic" (*Surgeon Major F. Robb, Ahmedabad*).

The above opinions show how widely and uniformly the properties of the *papaya* are believed in by Native and even by European Medical Officers.

FOOD
Ripe fruit
580
Green fruit
Curries and
pickles.
590
Other modes
of preparation
591

Food—When ripe the fruit attains the size of a small melon, the interior is soft, yellow, and sweetish, eaten by all classes and esteemed innocent and wholesome. When green it is cooked by the natives in their curries and also pickled. The ripe fruit has a flavour peculiar to itself, the better qualities are eaten without sugar, and by many persons are ranked among the first of eastern fruits. By others the *papaya* is eaten with pepper and salt. The seeds have a pleasantly pungent taste, not unlike mustard, hence in all probability the idea occasionally alluded to that this is the mustard tree of the scriptures. Lisboa says the fruit has a sweetish taste and makes an excellent tart. When boiled in slices it is eaten as a vegetable. Don says that in South America the fruit after being boiled and mixed with lime juice and sugar is used in place of apple sauce. Sloane remarks that the unripe fruit is cut into slices and soaked in water till the milky juice is removed. It is then boiled and eaten as turnips or baked as apples. A few drops of the milky sap of the papaw is said to render meat tender. The author of the *Atkhsan* recommends that for this purpose the juice should be mixed with fresh ginger. In Barbadoes the flesh of animals is reported to be hung on the tree over night in order to soften it. This idea prevails all over India and is doubtless often resorted to by domestic servants. Drury confirms this and states that he has personally tested the accuracy of the popular notion. Dr. John Davy (*Edin Ph I, 1855*) declares that this is due to accidental causes. According to some writers the best plan to soften meat is to wrap it overnight in the *papaw* leaves, or to drop a little of the fresh juice into the vessel in which the meat is being cooked. Brandis mentions another process, namely, to wash meat with water impregnated with the milky juice. It is even stated that meat is rendered tender by causing the animals to eat the seeds before they are killed. The best qualities of *papaw* are said to be obtained from Singapore and Moulmain stock. "The green fruit, when peeled, boiled, cut into small pieces, and served with sweet oil, vinegar, salt and pepper, serves as a very palatable vegetable, and is very similar to squash in taste" (*Mr. L. Listard*).

Juice,
592

TIMBER
593

Structure of the Wood—The stem of this fast-growing tree is too spongy and fibrous to be regarded as affording timber. Gamble describes it as soft wooded.

DOMESTIC,
594

Domestic—The juice is used by freckles. It is also exceedingly applied to the skin (*Treasury of* by the Negroes in washing linen as a substitute for soap (*O'Shaughnessy*).

C. 594

The Blistering Papaya of Brazil

CARISSA
Carandas

Carica spinosa.

A branching tree met with in Guiana and Brazil, has a much more acrid juice than the other species. If dropped on the skin it causes disagreeable blisters. The fruit is not eaten, and its flowers have a cart
dru;

MEDICINE
Juice.

595

CARISSA, Linn, Gen Pl, II, 695

A genus of densely branched, spinous, erect shrubs, belonging to the APOCYNACEÆ. There are some twenty species African Asiatic, and Australian. Sir J. D. Hooker remarks of the five Indian species that they are probably mere forms of one or two very variable plants.

axillary, pedun-
thers included,
very 2-lobed, 2
Ovules 1 3 in
tely attached to

the septum without a wing or pencil of hairs

Carissa Carandas, Linn, Fl Br Ind, III, 630, Wight, Ic, t 426, APOCYNACEÆ

Syn — C. congesta, Wight, Ic, t 1259, Bedd, Fl Sylv, Man, 156, Anal t 19, fig 6

Vern — Karaunda, karunda, or karonda, garinga karrona, timukhia,

596

R

Botany, Firminger, Man Gard, 256

Habitat — A dichotomously branched bush, cultivated for its fruit in most parts of India, said to be wild in Oudh, Bengal, and South India.

DYE.
Fruit
597MEDICINE
Fruit

598

Root.

599

used in the form of curry and chutney by the natives" (Assistant Surgeon Anund Chunder Mukerji, Noakhally). "Antiscorbutic, expector-

C. 599

CARISSA
spinarum

The Karunda.

MEDICINE

ant" (*Surgeon W Barren, Bhuj, Cutch*). "The juice is irritant and capable of producing
with food, and has, I

J M. Zorab, Balasori

much used at the coi

P N Mukerji, Cuttack, Orissa

FOOD

Pickle

600

Preserves

601

TIMBER

602

DOMESTIC

Fences.

603

Food —The fruit is made into pickle just before it is ripe, and is also employed in tarts and puddings; for these purposes it is superior to any other Indian fruit (*Firminger*). When ripe it makes a very good jelly (equal to red currant), for which it is cultivated in the gardens owned by Europeans. The natives universally eat the fruit when ripe, and ex-

number of
arb)

Carissa diffusa, Roxb, Fl Ind, Ed C B C, 231, Syn for C. spinarum, A, DC, which see

604

C. macrophylla, Wall, Fl Br Ind, III, 631.

Syn —*CARISSA LANCEOLATA, Dals, C DALZELLII, Bedd, Fl Sylv, Man, 157*

References —*Dals & Gids, Bom Fl, 143, Lisboa, U Pl of Bom, 166.*

Habitat. —A large shrub with very strong, curved thorns, common on the Deccan peninsula, Coorg (*Heyne*), Konkan at Ramghat (*Dalzell*); Courtallum (*Wight*). The flowers are much larger than those of the other species

FOOD

Fruit

605

606

Food —The fruit is eaten, it is about the size of a plum and ripens in May. *Beddome* says it is superior to that of *C. Carandas*.

C. spinarum, A DC, Fl Br Ind, III, 631, Wight, Ic, t 427

Syn —*C. diffusa, Roxb*

The *Flora of British India* regards this species as probably only a state of

V

Vern —*Karunda* HIND, *Gan, garunda, garna* PB, *San karunda, anka koli, URIYA, Karamadika, SANS, Wakolu, TEL, Kanuwan, ORAON*

References —*Roxb Fl Ind, Ed C B C, 231 Brandis, For Fl, 321, Thwaites, Pl, 116, ed; Bal- U. Pl of*

Lom, 160

Habitat —A small, thorny, evergreen shrub, wild in most parts of

thence northward to the mouth of the Hughli (*C. diffusa*).

C. 606

The Carnelian.

CARNELIAN

Medicine.—This plant is mentioned by Baden Powell amongst his

MEDICINE.

Wood.
607

Food.—The fruit is eaten in tarts. The leaves are greedily devoured by goats and sheep.

FOOD.
Fruit.
608
FODDER.
600
TIMBER.
610
DOMESTIC.
Fences.
611
Fuel
612

Domestic Uses.—Largely used for dry fences, but spreads so rapidly where clearances have been made that it may impede the reproduction and growth of the forest. It coppices freely and makes excellent fuel.

CARMINE.

Carmin and Carminic Acid.

CARMIN, *Fr.*; KARMIN, *Germ.*; CARMINIO, *It.*

References.—*Balfour's Cyclopad*; *Use's Dictionary of Arts, Manuf., and Mines.*

A pigment of a bright red colour, made from cochineal and alumina or bichloride of tin. This is prepared by throwing into a decoction of cochineal a certain proportion of the base employed. A salt is produced which is allowed to precipitate in shallow basins. The colourless liquid is decanted and the powder carmine dried and preserved. By the old German process carmine is prepared with alum.

The uses of Carmine have recently been greatly extended. It is employed for making fine red inks and for silk-dyeing. It is the finest red the water-painter, and more especially the miniature painter, possesses. The French carmine and rouge is preferred to the English. See Cochineal.

Carnation. See Clove.

CARNELIAN.

614

The Carnelian and the Amethyst, perhaps, the best known members of the Chalcedony series, are the only ones in which the silicic anhydride, but hydrated silica also exists. This has led to the classification of the quartzose minerals into—

1st—Transparent Crystallised Quartz or Anhydrous Quartz, as represented by the ROCK CRYSTALS. These, when violet, are known as the Amethyst, and when yellow or sherry-coloured as the Cairngorm, but numerous intermediate shades also exist from red to black.

2nd—Uncrystallised or Crypto-Crystalline Anhydrous Quartz.—This corresponds to the Chalcedony series, but by most writers this is also made to include JASPER, an opaque rock of undefined nature rather than a definite mineral. The term AGATE is sometimes given generically to denominate this series, or Agate and Chalcedony are used as synonymous terms.

3rd—Uncrystalline Semi-transparent to Opaque Hydrated Quartz.—The OPAL may be given as the type of this group.

C. 614

CARNELIAN.

The Carnelian.

QUARTZ.

The quartzose stones referable to the above sections are extensively used in India for ornamental purposes, in the lapidaries' art, in decorative architecture, and in the manufacture of cheap jewellery. They are popularly assigned a position with the "inferior gems"—the diamond,

were apparently not known to the ancients, and when first brought to their attention obtained fabulous prices. Pliny mentions that fragments of a small Cambay cup were exhibited in the theatre of Nero, "as if," adds Pliny, "they had been the ashes of no less than Alexander the Great himself." Balfour remarks with much truth that "amongst the people of India the inferior gem for its intrinsic price, and in which the chief value so the trade in these extensive than it is to definitely express. Indeed, the utmost that can be done in this direction, is to remind the reader of the elaborate decorations of the Taj Mahal."

bay and Broach hold their own carbuncles, carnelians, and agate factories in rock crystals, and Ja Rajputana and the Panjab have industry in ornamental stones of the foreign trade in certain of the Indian lapidary industries known under the generic name of *ma-hu-ya*.

EXPORTS
615

EXPORTS FROM INDIA OF INFERIOR GEMS—Under the heading JADE STONE Burma is said to have exported, since the beginning of the present decade, the following quantities and values —

YEARS.	Quantity.	Value.
	cwt	£
1880-81	3,371	8,03,890
1881-82	7,788	23,01,800
1882-83	4,159	9,00,900
1883-84	3,849	8,12,960
1884-85	3,733	5,60,050
1885-86	3,842	5,00,050
1886-87	2,890	5,61,000
TOTAL	29,637	64,40,650

Thus during the past seven years, British Burma has exported over half a million of pounds sterling worth of jade, an amount which has gone

Exports of Inferior Gems.

CARNELIAN.

EXPORTS

wood 7.64 per cent, cutch 2.56 per cent, and jade-stone 3.51 per cent. From the table given above it will be seen that the exports of jade during that year were exceptionally high, but it may safely be added that jade still holds a position as the fourth or fifth most important article of export from Burma, and that, with the extension of the British frontier, the trade in jade, in rock crystals, and in the nobler gems may in the future be considerably extended. The exceptional development of the trade in 1881-82 was due to the discovery of a new mine and the decrease that followed accounted for by the jade thus sent into the market having proved much inferior to the stone usually exported.

An inferior quality of jade-stone is also found at Mirzapur, and a very considerable trans-frontier trade is done in the Panjab in Karakash jade from Turkistan, and in jade and imitations of jade or false jade from Kashmir. (See on a further page, under AGATE, variety *plasma*.)

We have alluded to jade in the present connection, not from an established belief that it belongs to the quartzose group of minerals with which we are at present dealing, but because it is one of the so-called inferior gems. The chalcedony and rock crystal gems, however, are even as extensively employed in India as jade-stone, yet it has been found difficult to furnish definite facts regarding the extent of the internal and foreign trade in these. Perhaps the most interesting of the early accounts of the Cambay trade and industry in "Cambay stones" and

during the first few years of the present century

The following figures give some idea of the trade:—

The exports were valued in—

	R
1804 at	49,140
1808 at	54,240
Passing over 70 years they were in	
1874 valued at	84,370
1878 at	50,970
but the returns for the five years ending 1878 show an average of	70,000

CARNELIAN.

The Rock Crystal.

ROCK
CRYSTAL.
616

We must now describe, as briefly as possible, the principal quartzose inferior gems —

1st—ROCK CRYSTAL, *Mallet, Mineralogy, 62.*

Vern — *Bilaur, Hind., Phatak, GUJRATI, Tansala* (smoky Cairngorm),
Fr The Burmese name for an Amethyst signifies "egg plant, Sapphire"

References — *Ball's Econ Geol., 502, Balfour, Cycl of India; Bomb Gaz, VI, 201 Mason's Burma (1890), p 579, Calcutta Jour Nat Hist, II Madras Jour, Lt and Sci, VII, 172 Mysore Gaz, I, 20; Central Prov Gaz, 506, Oldham, Jour As Soc, Beng, XXIII, 271*

CHARACTER OF — When pure this mineral consists chiefly of silicic acid, it is an oxide of the carbon-silicon group The differently-coloured forms of rock-crystal owe their tints to the presence of small quantities of foreign minerals These coloured crystals are known by various names such as the Amethyst, Cairngorm, Rose-quartz, Pellucid-quartz, False-topaz or Citrine, Smoky-quartz, Milky-quartz, Prase, Aventurine-quartz, &c

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ture of red sandal, it takes a deeper red tint, into tincture of saffron, a yellow, like the topaz, into a tincture of turnesol, a yellow like the topaz, into a mixture of tincture of turnesol and saffron it becomes an imitation of the emerald Crystals coloured red are known in France as *rubaces* or false rubies,

PROVINCES WHERE MET WITH — Rock Crystals are very abundantly met with in South India, as, for example, at Vellum in Tanjore, in the Godavery basin, and at Hyderabad In the Bombay Presidency they are found at Tankara in Morvi Blocks from one to twenty pounds are found as clear as glass and capable of taking a high polish (rock crystals are also imported into Cambay from Ceylon and China) They are by no means uncommon at Sambalpur in the Central Provinces Agates and quartz in great quantities are found in the Mahál hills in Bengal Bannu, Sháhpur, and size have been found d crystals as rubies

large crystals are found in their country Milky-quartz occurs in Mergui

stones, the value being about the same as garnets The crystals of Sambalpur are not worked and they have accordingly no local value. At the foot of the Delhi palace a number of vases, pitchers, drinking cups, &c, cut in transparent quartz were found These are supposed to have been cut out of large crystals found at the Arvali quartzites in the neighbourhood. The Shans of Upper Burma are said to be experts at making imitation gems from rock crystals.

The Agate.

CARNELIAN.

2nd — AGATE, Mallet, *Mineralogy*, 70AGATE.
617

The name Agate is supposed to be derived from the *achates* (ἀχάτης) river in Sicily, or from *akik*, a river, in Arabic. AGATE *Fr*, *Achat*, GERM, *Akik*, ARAB, *Jamni*, HIND (agate), *Chakmak* (a flint), HIND, *Manka*, HIND (cut agates and beads brought from Kandahar), *Asshar*, HIND (Silica), *Pathanni*, HIND (blood-stone)

They are commonly known to Europeans as Cambay stones or Godavery pebbles

References — *Hamilton, Capt* (1692), *New account of the East Indies*, I, 143, *Hove, Dr* (1767), *Explorations in Bombay*, *Sel Rec Bomb Govt*, VI, 1, pp 49 to 51, *Kennedy, Dr* (1826), *Trans Med & Phys Soc, Calcutta*, III, 425, *Wallace, Major* (1854), *Sel Rec, Govt, Bomb*, V, 111, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 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965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

SOURCES — Indian Agates are mainly obtained from the mines of Rewa Kantha in the Bombay Presidency, but they exist also in Bengal in the Rajmahal and Singhbhum districts, in Hyderabad, and in the Central Provinces at Jabulpur

jamni The colour varies, but is generally a greyish white. Both kinds come from north east Kathiawar, near Mahedpur in Morvi, three miles from Tankara. Of the stones which lie in massive blocks near the surface, the most perfect do not exceed five pounds in weight, while those of inferior quality, in many cases cracked, weigh as much as sixty pounds. These stones are brought to the Cambay coast by the

Like the common agate the moss agate, *sua phay*, comes from Bud Kotra, three miles from two feet under the surface. a pound to forty pound the common agate. W on a base of crystals, s dark green or red-brown moss

CARNELIAN.

The Agate.

AGATE

showing either a dark ground with white streaks, or dark veins on a light black ground."

CHARACTER OF—Agates are concretionary masses or nodules, which occur usually in hollows or veins in volcanic rocks. When cut across the sections show layers. "The colour markings are often in concentric rings of varying forms and intensity, or in straight parallel layers or bands. The colours are chiefly grey, white, yellow or brownish red." The composition of most of the forms of agate and carnelian is from 70 to 96 per cent of silica, with varying proportions of alumina, coloured by

by the more porous layers of the stone; it subsequently becomes carbonised, and thus the contrast of the various colours is heightened. The

clear greyish
various shades.
es are found in
m as found in

2 "Moss agates are such as contain arborisations or dendrites of oxide

blood drops

4 "Plasma, a grass-green stone, found engraved in ruins at Rome, on

employed
d in the
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m known

chiefly by its zigzag pattern.

USES OF—Agates are much used for ornamental and domestic purposes
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paper-cl

The Carnelian.

CARNELIAN.

ing in marble and to a certain extent are so employed at Agra and
made Agates are also
book-binders, they are
as well as employed for

AGATE.

erial of which the *misery-*
ade Professor Muller
seems to be of opinion that it was flourspar, but Ball very properly com-
ments upon this opinion "if it was obtained at Ujein or Ouzein, or any
other locality within the trappean area, it was almost certain to have been
one of the chalcedonic minerals, *viz*, carnelian or agate. Flour spar is
not known to occur in the trap."

3rd—CARNELIAN (from *Caro-nis*, flesh, in allusion to the colour),
Mallet, *Mineralogy*, 72.

CARNELIAN
618

CORNALINE, *Fr.* KARNEOL, *Germ.* CORNALINA, *It.*

Vern — <i>Langi dikh</i>	as from
Kandahar) Ps,	up in
Gujarat One o	s Kyu-
three or fowl s bl	red ear
nelans	

References.—Ball, *Econ Geol*, 506. Balfour, *Cycl*, I, 555 & 583. *Encycl Brit* I, 277. *Ure's Dict, Arts, &c*, I, 650. Baden Powell *Pb Prod*, 97. Copeland, *Bomb Researches*, Thomson, *Isad Jour*, Lit and Sci, V, 161.

be consulted

CHARACTERS OF—Dana defines the carnelian as a reddish variety of chalcedony, generally of a clear bright tint, but it is sometimes of a yellowish red.

Rátan-
es come
rbadda,
Burma.

Mergui, and abundantly so in Japan

ARTIFICIAL COLOURING OF AGATES INTO CARNELIANS—While collecting the pebbles the miners divide them into two primary classes—those that are not improved in colour by burning, and those that are. Of the former there are three chief varieties (1) the Onyx, known as *mora* or *bawa ghari*, (2) the Cat's-eye, *cheshamdar* or *dola*, and (3) a yellow half clear pebble called *rori* or *lasania*. All other stones are baked to bring out their colour. "During the hot season, generally in March and

CARNELIAN.

The Onyx and the Jasper.

CARNELIAN

carried to the Nerbadda and floated to Broach Here they are shipped in large vessels for Cambay, and are offered for sale to the Carnelian dealers.

"By exposure to the sun and fire, among browns the light shades brighten into white, and the darker deepen into chestnut Of yellows, maize gains a rosy tint, orange is intensified into red, and an intermediate shade of yellow becomes pinkish purple Pebbles in which cloudy or clear bands of the palest flesh and even red, free stone, the more large, thick, even and variegated

stones are worth little "

Uses or—Carnelians are extensively used for seals. Many of the antique gems are engraved on carnelian

ONYX,
619

4th—ONYX, *Mallet, Mineralogy*, 73

ONYX, ONICE, *Fr*, ONYX, *Germ*, ONIQUE, *Sp*

References—*Ball's Econ Geol* 503, *Mason's Burma*, 581 *B Heyne, Indian Tracts*, p 265, *Newbold, Jour Royal Asiatic Soc*, IV 37

The Onyx resembles the agate very closely, differing only in the fact

and such like articles

JASPER.
620

5th—JASPER, *Mallet, Mineralogy*, 76

JASPE, *Fr*, JASPISS, *Germ & Dutch*, DIASPRO, *It*, JASCHNA, *Russ*

References—*Mason's Burma*, 581, *Ball, Econ Geol*, 503

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classification It is
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Toungoo Mountains" Jasper is abundant in the transition rocks of Kadapah, ribbon jasper is said by Mr. Foote to be largely produced in the Sandur hills in Bellary Bright red jasper is also reported to be abundant in the transition rocks of the Narbada and Sone Valleys. Nodules of jasper are also common in conglomerate rocks

C. 620

The Opal and the Cat's Eye

CARNELIAN

Uses or — Sometimes employed for seals

JASPER
HELIETROPE

6th—OPAL, *Mallet, Mineralogy, 80.*

OPALE *Fy*, OPAL, *Germ*, OPALO, *It*, *Dhudia pathar*, HIND
Chalcedony and Opal are sometimes known as *Gomed*
sannidh, HIND

OPAL
621

This is a compact uncrystalline semi transparent to opaque hydrated silica. When of milky white colour, opalescent, and exhibiting a rich play of colours, it is the *Noble Opal*. When not opalescent it is the *Common Opal*. The former are obtained chiefly from Hungary and

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On being first dug out of the earth opal is said to be soft, and to harden and diminish in bulk on being exposed to the atmosphere.

7th—CAT'S EYES, *Mallet, Mineralogy, 69*

This stone is perhaps closely allied to Onyx, but by some writers it is placed nearer rock crystal. It is a translucent quartz, presenting a peculiar opalescent reflection, said to be due to the presence of asbestos. It bears to the eye of a cat, and, their name for the stone, the stones are common and are found are not known. Malabar Coast is generally

CAT'S-EYES.
622

accepted as a form of cat's eyes. They are sent from Cambay to Bom

and *Lussung* are names given to a much valued pebble, found scantily with cat's eyes in the Rájppla mines of Bombay (*Select Records, Bomb., New Series, No IV, 31*)

LAPIDARIES' ART

It is not proposed to deal with this subject in the present article, it having been deemed desirable to give in one place under "LAPIDARY" an abstract of all that is known regarding this industry, not merely as practised with the inferior gems but with all gems and ornamental stones. For convenience the reader may, however, be referred to the following works which deal more immediately with the cutting, &c., of the inferior gems —

Bom. Gaz., VI, 201. *Hoey, Trade and Manuf. of Northern India*, pp 54 and 119. *Baden Powell, Pb. Manuf.*, 192. *Kipling, Cat. Cal. Intern. Exh.*, Pb. Section, 28. *Burma Admin. Rep.*, 1887-83, p 64. *Hendley, Indian Art Journ.*, Part 2, 28

The above account of the inferior gems was in type before the writer received Mr. Mallet's Vol IV of the "Manual of Geology of India"

CARPETS AND RUGS.

Carpets

CAT'S EYES

He has therefore been unable to do more than give references to Mr. Mallet's account of these minerals, but the reader is referred to that work for fuller particulars.

See "CARBUNCLE," "DIAMOND," "JADE," "GARNET," "LAPIDARY," "PRECIOUS STONES," and "RUBY."

Carob tree. See *Ceratonia Siliqua*, Linn; LEGUMINOSÆ

CAROXYLON, Thumb, Gen Pl, III., 71.

623 Caroxylon foetidum, Moq, Fl Br Ind, V, 18, CHENOPODIACÆ
Syn for SALSOLA FOETIDA, Del, which see, also under CAMEL FODDER, 39

C. Griffithii, Moq, DC Prodr, XIII 2, 175

An Afghanistan plant, supposed by Stewart and several other writers to be the botanical name for the Sind and Panjab lana, from which *Khar-sajji* is made. This is *Haloxylon recurvum*, Bunge, or the *Salsola lana*, Stocks. Fl Br Ind V, 15. See also under Camel Fodder 21, and *Haloxylon recurvum*. Correct the mistake of Caroxylon Griffithii into *Haloxylon recurvum* in BARILLA, B 163

CARPESIUM, Linn, Gen Pl, II, 336

624 Carpesium abrotanoides, Linn, Fl Br Ind, III, 301, COMPOSITÆ

Syn —CARPESIUM RACEMOSUM Wall

Vern —Wotiangi, KASHMIR, Hukmandar, Ps

Reference —Baden Powell, Pb Pr, 357

Habitat —A stout herb met with abundantly in Kashmir, extending along the Himalaya to Sikkim, altitude 5000 to 10000 feet. Some of the specimens so named by Wallich belong to *Rhynchospermum verticillatum* Retzow, a plant which extends to the Khasia Hills and Burma, descending to lower altitudes than *Carpesium*.

DYE

625

medi-
properties

CARPETS

626 Carpets and Rugs

TAPIS, Fr, TEPPICHE, Germ, TAPYTEN, Dutch TAPPETI
It, TAPETES, ALFOMBRAS, ALCEITIFAS Sp, KOWRU, KILIMI,
Rus

The term Carpet is probably connected with the Latin *tapetes* from whence tapestry

Vern —Dori (small rug), *satranji* (large carpet) cotton, Adlin (large carpet), *galicha* or *kilicha* (small rug) woollen HIND, *Ghalichah* PERS, *Jamkalam* TAM, *Jamco* so, TEL, *Jamkhani* (in Belgau), BOME, *Parmadani*, MALAY

C. 626

Carpets.

CARPETS AND RUGS.

References.—Birdwood, *Memo*, 29th Sept 1879, *Indian Arts*, 284, Vincent F. Robinson, *Eastern Carpets*, also *Journ. Soc. Art* (1886), p. 437; Baden Powell, *Manuf. and Arts, Panjab*, pp. 10 & 26; Dr Forbes Watson's *Rep.*; Col. Davidson in *Rep.*, Hyderabad Com-

It is not contemplated in the present article to do more than draw attention to the main facts regarding the Indian Carpet Industry, the object being more to indicate the nature of the carpets made, the materials of which they are woven and the dyes employed in their coloration, than

there are carpets woven by the warp horizontal, and others in which it is vertical. The former are chiefly cotton carpets and the latter nearly always woollen, although it is frequent in both classes to use cotton or hemp for the warp and wool or hair for the woof. The warp, with the single exception of the so-called Jabbalpur *dari*, is not coloured, but the woof is so manipulated that in both these classes of carpets it covers the warp. The Jabbalpur *daris* are almost precisely of the same character as the Kidderminster or Scotch carpets—a certain proportion of the pattern being developed by the coloured warp which may be either in bands of different shades or of one uniform colour. In such carpets longitudinal or checked patterns are produced, whereas in the ordinary *dari* or cotton carpet the patterns run across the warp.

Popularly the terms *dari* and *sattranjî* are applied synonymously to cotton carpets, but in more precise language, the former is a rug or small cotton carpet and the latter a large one. *Dar-fel-mad* is a

vertical warp

The following extracts from the *Bamboo Carpetry* (Vol. VIII, 1881)

1st, *DARIS*—“The cotton carpet loom which lies horizontally along the floor passes round stout poles at either end which are secured by ropes

DARIS.
627

The striped cotton carpet loom differs from the coarse cloth loom only by

CARPETS AND RUGS

Carpets

CATS EYES

He has therefore been unable to do more than give references to Mr. Mallet's account of these minerals, but the reader is referred to that work for fuller particulars

See "CIRRUNCLE," "DIAMOND," "JADE," "GARNET," "LAPIDARY," "PRECIOUS STONES" and RUBY

Carob tree. See *Ceratonia Siliqua*, Linn; LEGUMINOSÆ

CAROXYLON, Thunb., Gen Pl., III., 71.

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Syn for SALSOLA FOETIDA, Del., which see, also under CAMEL FODDER, 39

C. Griffithii, Moq., DC Prodr., XIII, 2 175

recurvum in BARILLA, B 163

CARPESIMUM, Linn., Gen Pl., II., 336

624 Carpesium abrotanoides, Linn., Fl Br Ind, III, 301, COMPOSITÆ

Syn —CARPESIMUM RACEMOSUM Wall

Vern —Woliangil, KASHMIR, Hukmandus, Pb

Reference —Baden Powell Pb Pr, 357

Habitat —A stout herb met with abundantly in Kashmir, extending along the Himalaya to Sikkim altitude 5000 to 10000 feet. Some of the specimens so named by Wallich belong to *Rhynchospermum verticillatum* Reintw., a plant which extends to the Khasia Hills and Burma descending to lower altitudes than *Carpesium*

DYE
625

are quite unknown to the Chinese people

CARPETS.

626 Carpets and Rugs

TAPIS Fr., TEFFIGHE Germ., TAPYTEN Dutch TAPPETI It., TAPETES ALFOMBRAS, ALCITIFAS Sp., KOWRU, KILIMI, Rus

The term Carpet is probably connected with the Latin *tapetes* from whence tapestry

Vern —Dars (small rug) satranjs (large carpet) cotton, Kâlin (large carpet) galcha or kâlichâ (small rug) woollen HIND, Ghalichah PERS, Jan kalâm TAU, Jamcaia, TEL, Jemkhani (a Belgaum), BOMB, Parmadani MALAY

C. 626

Carpets.

CARPETS AND RUGS.

References.—Birdwood, *Memo*, 26th Sept 1879. *Indian Arts*, 284.
 Vincent F. Robinson, *Eastern Carpets*, also *Journ Soc Art* (1886),
 p. 437; Baden Powell, *Manuf and Arts, Panjab*, pp. 10 & 26;
 Dr Forbes Watson's *Rep.*, Col. Davidson in *Rep.*, Hyderabad Com-

It is not contemplated in the present article to do more than draw attention to the main facts regarding the Indian Carpet Industry, the object being more to indicate the nature of the carpets made, the materials of which they are woven and the dyes employed in their coloration, than to treat of the historic and artistic features of the manufactured articles. Indian carpets may be classified either according to the nature of the materials of which they are made or the manner in which they are woven. There are cotton, woollen, silk, goat's hair, yak's hair, and pashm carpets, or mixed carpets of any two or more of these materials. Then again, there are carpets woven by the warp horizontal, and others in which it is vertical. The former are chiefly cotton carpets and the latter nearly always woollen, although it is frequent in both classes to use cotton or hemp for the warp and wool or hair for the woof. The warp, with the single exception of the so-called Jabbalpur *darî*, is not coloured, but the woof is so manipulated that in both these classes of carpets it covers the warp. The Jabbalpur *darî* are almost precisely of the same character as the Kidderminster or Scotch carpets—a certain proportion of the pattern being developed by the coloured warp which may be either in bands of different shades or of one uniform colour. In such carpets longitudinal or checked patterns are produced, whereas in the ordinary *darî* or cotton carpet the patterns run across the warp.

Popularly the terms *darî* and *satranjî* are applied synonymously to cotton carpets, but in more precise language, the former is a rug or small cotton carpet and the latter a large one. *Darîs* (=dar, a door,

the village in which speak of *darîs* for all cotton carpets and *carpets* for woollen carpets, but more particularly pile carpets or those woven on a vertical warp.

The following extracts from the *Ramhau Gazetteer* (Vol. VIII) express clearly same time they variations, thro

1st, **DARIS**—“The cotton carpet loom which lies horizontally along the floor passes round stout poles at either end which are secured by ropes tied to strong wooden pegs driven into the ground. The weavers crouch on a broad wooden plank placed across the warp. This plank rests on stones at the side of the loom, and as the work goes on is moved forward. The door is formed by the

Persian carpets—by strands of the warp, being cut off, these e instrument called hidden by the weft, which forms the colouring of the carpet. The loom has only two heddles. The striped cotton carpet loom differs from the coarse cloth loom only by

DARIS
627

CARPETS AND RUGS

Carpets

DARIS.

being broader and having a stronger reed or *phant*. The chief aim of the carpet-weaver is to hide completely the white warp-yarn, leaving

the well yarn none thus using a greater length of well yarn than the breadth of the carpet

"A cotton carpet costs from $3\frac{1}{2}d$ to $7\frac{1}{2}d$ ($2\frac{1}{2}$ annas to 5 annas) a square foot

Mr Ba shuttle and
with it the issage of the
wool of the w by placing

a long pole, supported at either
whole width of the warp. This
means 'mare,' and so called for
from the 'gori' are hung two
of threads, which are attached to the under and upper threads of the web
respectively. When it is desired to cross the threads of the warp, it is
simply necessary to pull up one of the bamboos and lower the other,
as the bamboos are merely hung to the 'gori' by ropes at each end,
the raising and lowering is easily done by tightening or loosening the
suspending string by means of a stick attached. No regular shuttle
is used. A number of workmen sit in a row, on that part of the *durree*
(*dūri*) which has already been completed, and pass the thread along
between the lines of the warp, from hand to hand. The thread is wound
in a long egg shape on an iron skewer or needle

and so on, the threads as they are passed through the threads of the
warp are kept close together and the work is rendered compact and

Woollen *daris* are, however, also made in many parts of India, as in
the Panjáb and Bombay. Those woven by the aboriginal races are
small in size, thick in texture, and even painfully uneven in quality but

Carpets.

CARPETS AND RUGS.

the fact that in India they are often spoken of as Persian carpets, Indian carpets "Carpet-making all the parts of the loom, seems to be almost entirely in the hands of the weaver."

PILE CARPETS.

"Persian carpet-looms differ from plain carpet-looms in having the warp fastened vertically, instead of horizontally, in the absence of heddles and treddles, and in the absence of the reed *phans*. The loom consists of two uprights, from fifteen to twenty feet high and from ten to fifteen feet apart, supporting two beams, one fixed to the lower ends of the uprights and the other moveable. The warp-yarn is passed round these beams forming a rectangle. On one side of the loom there are three to five uprights, and on the other side there are three to five uprights. A sketch of the loom is given in the accompanying illustration." out to the

that have to be taken up for the first row. The workmen repeat in chorus what the overseer says, and fix up the loops, tie a knot, and cut the pieces off. As soon as the first row is ready, a weft-yarn is passed between the two sets of the warp, and is fixed tightly in its place by the aid of a fork like instrument called the heckle. In this manner row after row is laid up, till the whole of the carpet is woven, when it is taken down from the loom, spread on the floor, and sheared.

"Persian carpets vary in price, according to texture and design, from 14s to £1-8s (R7—R14) the superficial square yard. There are (1882) seventy five Persian carpet weavers" (*Bomb. Gaz. XIII, District 401*)

PRESENT POSITION AND FUTURE PROSPECTS OF THE INDIAN PILE CARPET INDUSTRY.

cotton threads, which are soft in texture and not made hard and tight by over-twisting and sizing. On these wool thread is tied and the allowance of wool is very liberal. The looms are large enough to make any size of carpet, and there are, therefore, no seams. For ordinary English carpets the use of the heddle is not necessary. There is very frequently an extra row of threads on the back or front of the fabric. Into the fabric is woven, a long needle drawal of the knife with which the pile is cut. The demand for cheap

cuts away. In an Indian carpet, the whole fabric sinks together under the foot.

"Moreover, very few of the English jacquered power looms are more than three-quarters of a yard wide. Hence the necessity for seams, which are the first places to wear thread bare.

"So it may be said that it is more economical, when buying a carpet, to give three or four times the English price for an Indian hand woven fabric. It is not, of course, contended that bad Indian carpets are

Carpets

CARPETS AND RUGS.

ments of chemical laboratories with their processes introduced, and such a system of organised work set up as completely transformed not only the trade but actually the carpets themselves which were the foundation of

PILE
CARPETS.

Panjab was known beyond its border for the production of carpets, and then only by the productions of the Lahore jail executed for a London firm. There exist no specimens to show that the Multan industry, the

Vincent Robinson's address to the Society of Arts, he is reported to have said—'At one time I attributed this degeneration almost exclusively to the influence of the Government Schools of Art and the jails but at present I feel that it is chiefly due to the influence of English commerce on the historical handicrafts of India.' This seems a much more likely

to as follows in the *Gazetteer for Cambay* —

"Cambay carpets had once a great name. Among the articles mentioned in the proclamation of 1630 'for restraining the excess of private trade to the East Indies,' are rich carpets of Cambay. Later on a chief part of the Senior Factor's duty at Cambay was to buy carpets. Cambay carpets are spoken of as the best in the country. This trade has greatly increased since the British took possession of the place, and is now paying the Nawab a

Pile carpets are made of cotton at Hyderabad and at many other places, tufts of cotton yarn being used in place of wool. In the same way expensive pile carpets are made of all the best cotton yarn in the country.

higher prices than the others.

Pile Carpets ARE MADE at a limited number of jails in each Presidency and Province and by a few private manufacturers scattered here and there over the country. The references given to the *Gazetteers* convey some idea of the distribution of the industry, but it may be concluded that

CART AND CARRIAGE BUILDING. Woods used for.

PILE
CARPETS.

abad and Benares are best known

"COTTON,"
used in carpet

ends of car-
pets, cotton and woollen, are made can be obtained from the authorities of
the Indian Museum in Calcutta

629

CARPINUS, Linn, Gen Pl, III, 405

Carpinus faginea, Lindl.; DC Prodr, XVI, 2, 127, CUPULIFERÆ.

Vern — *Shirdsh*, *imar*, *byawm* Pb Gish, N W P

References — Brandis, For Fl, 492, Gamble, Man Timb, 390

Habitat — A moderate sized tree of the Himālaya, from Kumaon (and
Nepal) eastward altitude 4 000 to 7,000 feet

Structure of the Wood — Similar to the next species

TIMBER

630

631

C. viminea, Wall, DC Prodr, XVI, 2, 127

INDIAN HORNBEEAM

Vern — *Charkhri*, *kāi*, Pb, *Pumne*, *Goria*, *chamkharak*, N W P, *Chukish*,
konikath NEPAL

References — Brandis For Fl, 492; Kurz, For Fl Burm, 477, Gamble,
Man Timb, 390 Stewart, Pb Fl, 200, Eaden Penell, Pb Pr, 572,
Balfour, Cyclop

Habitat — A moderate-sized tree of the Himālaya, from the Ravi east-
ward, from 5 000 to 7,000 feet frequent near water. Also met with in the
Marabian Hills, altitude 5,000 to 6,000 feet, and according to Brandis,
on the Khasia Hills

Structure of the Wood — White, shining, no heartwood, warps in
seasoning. Weight 50lb per cubic foot, growth moderately slow. The
stem is irregular in section, like that of the European *Hornbeam*, which
it much resembles both in bark, wood, and general appearance. Cleghorn
states that it is much esteemed by carpenters

Carrot. See *Daucus Carota*, Linn, UMBELLIFERÆ

632

CART AND CARRIAGE BUILDING—Woods used for—

During the Colonial and Indian Exhibition two conferences were held
to examine the timbers shown in the Imperial Indian Section. Mr.
Hooper, the well-known London Coach Builder, remarked "That a wood
is much wanted in the carriage trade for —"

C. 632

The Safflower.

CARTHAMUS
tinctorius.

hot dry weather of the north seasoned the wood in a way very much superior to the artificial methods employed in Europe." The following are the timbers used in India for these purposes, more especially those marked*—

WOOD USED
FOR CART
AND CART-
AGE BUILD-
ING

Acacia ferruginea (carts)	*Lagerstrœmia parviflora (buggy)
A. melanoxylon (coaches, railway)	Melia Azadirachta (carts) [shafts]
Albizia amara (carts) [carriages]	Michelia Champaca (carriages).
Barringtonia acutangula (carts)	Milusa velutina (carts)
B. racemosa (carts)	Mimusops Elengi (carts)
Bassia longifolia (carts)	Prosopis spicijera (carts)
Berrya Ammonilla (carts)	*Pterocarpus indicus (carts, gun-
Bredelia montana (carts)	P. Marsupium (carts) [carriages]
B. retusa (carts)	Pterospermum suberifolium (carts)
Calamus Rotang (carriages)	Sandoricum indicum (carts)
Careya arborea (carts).	Sapindus emarginatus (carts).
Cassia Fistula (carts)	Schleichera tryuga.
Chloroxylon Swietenia (carts)	Shorea robusta
Cynometra ramiflora (carts)	Strychnos Nux-vomica.
*Dalbergia latifolia (wheels, gun car-	S. potatorum
riages)	Tectona grandis (railway car-
*D. Sissoo (felloes naves, carts).	Terminalia Arjuna. [riages]
Diospyros melanoxylon (carriage)	T. belerica.
Eugenia Jambolana (carts). [shafts]	T. Chebula.
Ficus bengalensis (cart yokes)	T. tomentosa
Gmelina arborea (carriages, palan-	Thespesia populnea (carts and car-
quins)	riages)
*Hemitelia littoralis (buggy shafts)	Ulmus integrifolia (carts).
Hymenodactylon excelsum (palan-	Vitex altissima (carts)
quins)	Xylia dolabriformis (carts).
*Lagerstrœmia Flos Regiæ (carts,	Zizyphus zxylopyra (carts).
gun-carriages)	

CARTHAMUS, Linn, Gen Pl, II, 483

Carthamus oxyacantha, Bieb, Fl. Br Ind, III 386, COMPOSITE

633

Vern —Kantari kandsira, poli, khāresa karar, poliyān Ps

References —Stewart Pb Pl, 123, Aitchison Cat, Pb Pl, 80, Baden Powell, Pb Pr, 356, Cooke, Oils and Oilseeds, 34, Balfour, Cyclop

Habitat —Wild in the North-West Provinces and the Panjab, most common in the more arid tracts. Mr G B Clarke thinks this may be the wild form of Safflower

Oil —Dr Stewart says that near Peshāwar and elsewhere in the Panjāb, an oil is extracted from the seeds which is used for illuminating purposes, as well as for food. Dr Stocks probably alludes to this when

OIL
634

C. tinctorius, Linn, Fl Br. Ind, III, 386

THE SAFFLOWER, WILD OR BASTARD SAFFRON, AFRICAN SAFFRON, AMERICAN SAFFRON, CARTHAMINE DYE, Eng, CARTAME, SAFRAN DATARD, Fr, DER SAFFLOR, FARBERDISTEL, FALSCH

MEDICINE
635
FOOD
636
637

C. 637

CARTHAMUS
tinctorius.

The Safflower.

SAFRAN, *Germ.*; ZAFFRONE, *CARTAMO, It. & Sp.*; POLERROI, *Russ.*

Vern.—Kusum, kusumba, kar (the seed), *barre*, *HIND.*; Kusum, kusamphul, kojirah, *BENG.*; Galap machu, *MANIPUR.*; Kásam, kurtam, kurtam, kasdi, (seed), a-virai, ube (or kusumba), kusumba, *NAN.*; JEDDAH, SH, KASHA, SUPAN, KROON, *BURM.*; Qurtum, qurtum, usfar, *ARAB.*; Kashirah, musfir, kasakdanah, *PERS.*; Kusumbha, kamalottara, kushumbha, *SANS.*; Kurtum, *EGYPT.* The κρήκος, κρίκος of the Greeks

In Sind the seeds are called *Kardai* (kurtum), and in Panjáb *Khar*, *polian*

References.—*Dark* *Ex* *1-3* *KI C R C* *for* *Stewart*, *Ph* *Pl* *12*

gra), 154

the origin of this plant. It has never been found in a wild state, but botanists assign to it an origin in India, Africa, or Abyssinia. De Candolle (*Origin, Cult. Pl*) says that the grave-cloths found on Egyptian mummies are dyed with carthamine. The Chinese received the plant only in the second century B C, when Chang-kien brought it back from Bactriana. The Greeks and Latins were probably not acquainted with it, although Birdwood and other writers give κρήκος as its Greek name. As

vated in India.

CULTIVATION
638

CULTIVATION.

A few years ago Safflower was an exceedingly important substance, but recently the aniline colours have driven it almost entirely out of the European market. "It still, however, holds its place with the natives as a brilliant though evanescent dye, and as they employ it largely for home use, it must still rank among the industries of the country, as

(*E. James*)
account of the
source of oil,
2, safflower is

C. 638

The Safflower.

CARTHAMUS
tinctorius.

chiefly grown as subsidiary to some other crop, participating, therefore, in the treatment given to its associate. On this account it is extremely difficult to obtain trustworthy details as to the area under safflower, the method and cost of cultivation, nature of soil necessary, or value of the crop.

(a) In Bengal it is chiefly grown in the Eastern division, where even still it constitutes a crop of some considerable value, although greatly decreased through the introduction of aniline dyes. In fact, the Indian safflower

CULTIVATION.

BENGAL.

630

Sown
Oct. to Dec.

riod of sowing
; for example,
are, as a rule,
been left fall-

the
the
res,
ture,
hree
cul-

Gathered
March to May.

even till May. In removing the florets, the flower-heads are not much injured, and as they are fecundated before the time of removal, the seeds continue to mature within their small, white, angular, one-seeded fruits, and are ripe in April to May. They are then collected for the oil crop (*Agric-Hort Soc. Journ., VII, 191*)

Area.

under this crop in Bengal, but the following figures are quoted from Dr. McCann's work (which is taken from the official returns sent to the Economic Museum): Dacca, 11,500 acres; Gya, 2,260 acres; Monghir,

N.-W. P. AND
 OUDH.
 640

CARTHAMUS
tinctorius

The Safflower.

CULTIVATION	38 per cent is irrigated land. The mode of cultivation is very similar to what has already been described for Bengal. Light soils are preferred, the plant is rarely grown alone, but is generally sown in the gram fields and disposed like rape in lines. It is extensively grown along with carrots near wells, participating in the rich cultivation bestowed on the latter. It is also associated with cotton, wheat or barley. In the North-West
Sown Oct to Nov	1
Price	1
BOMBAY, 641	1
Area	1
Sown Oct gathered March	1
Production	1
Varieties Sadhi 642 Kusambyachi 643	chiefly for its oil-seeds <i>kusumbyachi</i> a slenderer plant grown for its dye yielding flowers (<i>Bomb Gaz XII, 164</i>). In Gujarât the ' <i>kabri</i> ' or 'so'. The land is ploughed. The seed is thrown broad reaped in February. The
PANJAB 644	1
CENTRAL PROVINCES 645	1
Area	1

attinities of which have not been ascertained (*Duthie and Buller*). In a report on the dyes and processes of dyeing in Ajmir it is stated that about 20 000 maunds of safflower are annually received from Delhi, the

gain etc., to which last the cultivator looks for his profits. Probably

during the settlement, 288 acres under the crop and in Hoshiarpur 6,722 acres, especially in the northern part of the Garhshankar *Tahsil*. It is generally grown as a mixed crop in lines with gram and requires a sandy soil. It is sown in September.

(c) *In the Central Provinces*, a little over 6 000 acres are annually under this *rabi* crop and Raipur is stated to export the dye stuff to about Rs. 10,000 a year.

The *h. of not* or *as on the a same day* he safflower of Bengal, the North may and the Central Provinces, remain the official reports for the incorr either incomplete or quite are than 10 000 acres are under this crop in the remaining provinces of India.

C. 645

The Safflower.

CARTHAMUS
tinctorius.

(f) In Berar, safflower, however, appears to be cultivated to a very considerable extent. Mr. Liotard informs us that the area under it is over 40
obvious
cate a
is not
seems t
of the

CULTIVA-
TION
BERAR.
646

(g)
only in small patches, and there is no export trade.

MYSORE.
647
BURMA.
648

besides, Burma, instead of exporting safflower, receives annually a small

VARIETIES.

the Deccan alluded to above.

(b) Almost spineless form. This is known as *bhuulí* in Patna, *bod-hí* in Berar, *murliá* (or shaved) in Azamghar and the *kurumbyáchi* in the Deccan. A superior quality of dye is derived from this form.

Spiny Form.
649

Spineless
Form
650

OUTTURN.

Bengal as from R3 to R15 a bigha.

PRESENT POSITION OF THE SAFFLOWER INDUSTRY.

Simmonds in his *Tropical Agriculture* says: "The cultivation of safflower, known as *Coosumban* in Bengal, is receiving attention at the hands of the local Government. The prosperity of Bengal, which mainly depends upon the jute trade, is in some measure attributable to the demand for safflower." The writer proceeds to state that the value of the exports from Dacca alone "would be from nine to ten lakhs of rupees—£900,000 to £1,000,000." "The demand for safflower is increasing in Bengal, and the Government are now encouraging its cultivation from all India, and they were first established in Bengal."

YIELD.
651

CARTHAMUS
tinctorius

The Safflower

TRADE

ing" The total exports for 1886-87 were only Rs 3,819. The following table gives the exports from India for the past fourteen years —

Exports		
YEAR	SAFFLOWER	
	Quantity	Value
	Mds	R
1873-74	13,206	7,58,906
1874-75	14,222	6,50,827
1875-76	4,080	1,63,528
1876-77	7,662	3,04,672
1877-78	3,698	1,48,806
1878-79	4,977	1,86,711
1879-80	2,411	1,34,456
1880-81	6,675	3,51,157
1881-82	2,293	94,754
1882-83	3,008	92,038
1883-84	2,333	64,497
1884-85	2,167	83,083
1885-86	1,898	68,991
1886-87	2,149	83,819

report in June 1883 that "there is no land under safflower cultivation in

DYE
652
Preparation

THE DYE

superior to another—a fact accountable for either by the more favourable nature of the soil or the care bestowed in cultivation. If intended for export, after having been dried as above, the florets are either placed in a bag or on a basket or other contrivance permitting of the easy escape of a supply of water which is kept poured on them while beaten or trodden on. This process is continued until the water passes through quite

Yellow
653
Red
654

C. 654

The Safflower.	CARTHAMUS tinctorius.
water (if clean) is re- of mud or other im- colouring matter is care must be taken	DYE.
carefully dried, they are ready for the market. The <i>Gazetteer</i> for the district of Karnal in the Panjáb describes the	"Stripped Safflower." 655
delay in the preparation injures the dye" This process is so very defec-	Reason of lower price paid for Panjab Safflower.
	Originally grown for yellow dye.
	Adulteration. 656
to the continuance of even the present greatly reduced trade The	Cowdung. 657 Rice flour. 658 Turmeric. 659 Tobacco. 660
water, it is employed by fraudulent dealers in the adulteration of shag tobacco" (<i>Morton's Cycl. Agrs</i>)	

CARTHAMUS
tinctorius.

The Safflower.

DYE.

Estimation of
Quality.
661

The quality of safflower cake is estimated by dyeing a known weight of cotton; about 4 ounces of safflower will dye 1lb of cotton cloth light pink; 8 ounces will dye it full rose-pink; and from 12 ounces to 1lb will dye it a full crimson. In order to take up this quantity, the cotton must be several times dyed in fresh solutions of the colouring matter.

Chemical History.—It is scarcely necessary to go into great detail re-

Two yellows
and one red.

Carthamin.

36 per cent. of the florets, while from 0.3 to 0.6 per cent. is the usual amount of Carthamin. The proportion of Carthamin present varies, however, in the inverse ratio to the amount of the soluble yellow principle. The second yellow colour is soluble only in an alkaline liquor.

If the dye-stuff, after the removal of the soluble yellow principle, be acidulated with acetic acid, filtered, and first acetate of lead and next ammonia added, the second yellow colour will be precipitated along with

of the florets). In India pearl-ash is most frequently used, especially that prepared by incinerating *bajra* (*Penicillaria spicata*) or of *chir-chira* (*Achyranthes aspera*), (impure potassium carbonates), but the natural earth carbonate of soda or *sajji-matti* is also frequently employed for this purpose.

EUROPEAN
DYE
SOLUTIONS.
663

EUROPEAN DYE SOLUTIONS.

Preparation of Dye Solution and European Methods of Dyeing with

pletely alters the colouring matter.

The Safflower.

CARTHAMUS
tinctorius.

DYE.

"Carthamin in a pasty state, as obtained by the process just described, is met with in commerce suspended in water for direct use. The paste is dried upon suitable vessels—porcelain saucers, plates, or even upon polished cardboard.

Following passage may prove useful to Indian dyers or persons interested in the safflower industry. "Carthamus from which the yellow matter has been extracted and whose leaves have been broken down, etc."

in ca
cheri
the
long
it is
throu

and passed through fresh baths, continuing to wash and dry it between each operation, till it has acquired the depth of colour that is desired. When it has reached the proper point, a brightening is given it by turning round the sticks seven or eight times in a bath of hot water, to which about half a pint of lemon-juice for each pailful of water has been added.

When silk is to be dyed *ponceau* or poppy-colour, it must be previously boiled as for white, it must then receive a slight foundation of *arnatto*. The silk should not be alumed. The *natarats* and the deep cherry-colour are given precisely like the *ponceaux*, only they receive no *arnatto* ground, and baths may be employed which have served for the *ponceaux*, so as to complete their exhaustion. Fresh baths are not made for the latter.

"The lightest of all these shades, which is an extremely delicate flesh-colour, requires a little soap to be put into the bath. This soap lightens the colour, and prevents it from taking too speedily and becoming uneven. The silk is then washed, and a little brightening is given it in a bath which has served for the deeper colours.

"All these baths are employed the moment they are made, or as speedily as possible, because they lose much of their colour upon keeping, by which they are even entirely destroyed at the end of a certain time. They are, moreover, used cold, to prevent the colour from being injured. It

CARTHAMUS
tinctorius.**The Safflower.****DEY,**

must have been remarked, in the experiments just described, that caustic alkalis attack the extremely delicate colour of carthamus, making it pass to yellow. This is the reason why crystals of soda are preferred to other alkaline matters

"In order to diminish the expense of carthamus, it is the practice in preparing the deeper shades to mingle with the first and the second bath about one-fifth of the bath of archil" (*Ure's Dict of Arts, Man, and Mines, Vol. I., 661*).

INDIAN DYE
SOLUTIONS.**664****INDIAN DYE SOLUTIONS.**

Indian Method of dyeing with Safflower.—As already stated, the

appear to be known to the natives of India. The dye stuff, after the

the tamarind is employed in place of lime-juice. In Mánipur the fruits of *Garcinia pedunculata* are viewed as superior to lime-juice, and have

Combinations**665**

The Safflower.

CARTHAMUS
tinctorius.

DYE.

Use of acids
and alkalis.
666

N° IV P) With Terminalia Chebula or T. citrina and protosulphate of iron, safflower gives a dark neutral tint, with safflower, sappanwood, and alum a purplish brown, and with indigo and safflower, greens and purples (McCann, *Dyes and Tans of Beng*)

An almost indefinite series of colours are obtained in India by various combinations with safflower. It should be carefully observed, however,

rather case and
employed also
precipitating
been given it
fabrics, alkali
condition can
peculiarity be

accurate account of the indigenous modes of dyeing with safflower

Fixing Safflower Dye.—It is much to be regretted that no one has as yet discovered a mode of preventing the decoloration of safflower dye, its fleeting property appears to depend on the oxidation of the particles of carthamin held mechanically in the fabric. The inhabitants of different parts of India boast of possessing a secret of effecting this purpose and careful observation on the part of local officers may help to throw some light on the subject. All that is necessary to re-establish the carthamine dye as an important industry is the discovery of some mode of preventing this oxidation of carthamin. The fruit of *Garcinia pedunculata*, a common tree in Assam, has already been alluded to

FIXING
668

the property
extensive use
justifies this
us that the

dyes of Chittagong district claim to be able to produce a "semi-permanent" safflower dye. This is done by adding safflower to water in which

actually made use of now and then as a discharge, so as to produce a yellow pattern upon a pink ground, weak acids do not affect the colours, but chlorine and sulphurous acid destroy the colour at once" (Crookes). Safflower dyed fabrics should not be washed with soap, as the colour is removed by the alkali of the soap.

Rouge.—It is necessary to refer here very briefly to an important purpose for which safflower is employed, viz, the manufacture of rouge

ROUGE
669

C. 669

CARTHAMUS
tinctorius.

The Safflower.

DEV.

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INDIAN DYE
SOLUTIONS.
664

INDIAN DYE SOLUTIONS.

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Combinations.
665

The Safflower.

CARTHAMUS
tinctorius.

N. W. P.) With Terminalia Chebula or T. citrina and protosulphate of

DYE.

Use of acids
and alkalis.
666

employed along with the alkaline dye solution may have the power of

peculiarity be fully appreciated, otherwise the observer cannot give an

667

FIXING
668of preventing this oxidation of carthamin. The fruit of Garcinia
pedunculata, a common tree in Assam, has already been alluded toRouge.—It is necessary to refer here very briefly to an important
purpose for which safflower is employed, viz, the manufacture of rougeROUGE.
669

CARTHAMUS
tinctorius
The Safflower.
DYE

végétale. Thus trade is unaffected by the aniline imitations of safflower, and constitutes an article of considerable importance. The dry carthamine precipitate is sometimes called India or China lake, and this mixed with finely pulverised talc constitutes *rouge végétale*. (See Carmine; also Carnelian—the coloration of inferior gems)

OIL
670
THE OIL

There are two kinds of seeds, or, to be more accurate, of fruits—one

account of the little heat which it gives out (*Baden Powell*) It is used locally for culinary purposes, and is said to form an ingredient of the

Prices.

"In Bulandshahr the safflower yields about 7 maunds of seed per local *bigha*. The oil-cake is supposed to be the perquisite of the oil-presser in lieu of wages. A maund of seed yields 7 seers of oil, 14 seers of oil-cake, and 19 seers of husk or *bhusa*, and the oil sells at from 4 to 5 seers for the rupee, the cake at 36 seers, and the *bhusa* at 4 maunds" (*E. T. Atkinson*)

"The pure oil is seldom offered for sale. Though it lowers the quality of the oil, the outturn is generally increased by mixing its seeds with gingelly seed" (*Bomb Gas*, 153). Although the oil is apparently not exported from India a considerable trade is done with Liverpool and London in the seeds

EXPRESSION
Dry cold
671

Expression of Oil.—"The oil is expressed in the same manner as the

Dry Hot.
672

Dry Hot extraction of Oil.—"There is also another way of extracting the oil which is, I think, so peculiar that I will attempt to describe it. It

it, in fact, but this

sing his well ropes,

used for exposure

A hole is dug in the

jar or *gurrak* of any capacity,

then plate with a hole of about a

centre. Above this is placed

bhuira or *kussum* seed invert-

three is luted with clay, and

essels,—

Dried

The

the is kept in ignition for about half an hour, when it is removed. The

C. 672

Process of
extracting
the oil after
the Dry Hot
method.

The Safflower.

ARTHAMUS
tinctorius

upper inverted vessel is found to be about half full of the charred seed, and the lower one, which was imbedded in the ground about one third full of a black sticky oil. B charred, but the natives assert preservation of leathern vessels e worth the while of chemists this kind of oil would be of any commercial value at home. The yield of oil by this process is more than a fourth larger than by the press" (R W Bingham Jour Agri Hort Soc, XII, 340)

OIL

THE MEDICINE.

MEDICINE.

"This plant is the *kutumbhu* of Sanskrit writers, who describe the seeds as purgative, and mention a medicated oil which is prepared

DI
673

A fixed oil is prepared from it which the *Vytians* used as an external
ulcers,
which
into an
of the

dried flowers taken internally cures jaundice (*Hort Jamaica*, I, 72). Loursiro says that the seeds are considered as purgative, or *ecoprotic*, resolvent and emmenagogue. In South America as well as in Jamaica, the flowers are much used for colouring broths and ragouts.

Flowers.
674
Seeds
675

resemble in colour, but from which they may be distinguished by their tubular form, and the yellowish style and filaments which they enclose. In large doses carthamus is said to be laxative, and administered in warm infusion, diaphoretic. It is used in domestic practice as a substitute for saffron in measles, scarlatina and other exanthematous diseases to promote the eruption. An infusion made in the proportion of two drachms to a pint of boiling water is usually employed, and given without restriction as to quantity" (U S Dispens)

DI
677

as a dressing for ulcers" (*Surgeon W. Barren, Bhuj, Cutch*)

Decoction
678

Food.—Poultry fatten on the seed. *See* *Arb.*

FOOD
Seeds
679
Leaves
680

CARUM
Carul.

The Caraway.

CARUM, *Linn.; Gen. Pl., I., 890.*

681

Carum Carui, Linn.; Fl. Br. Ind., II., 680; UMBELLIFERÆ.
CARAWAY; FRUITS OU SEMENCES DE CARVE, Fr.; KÜMMEL, Germ.
Vern.—Shia jird (U. C. Dutt), sira, HIND; Jira, BENG.; Zira siyah,

References.—Stewart, Pb Pl., 104; DC. Prodr., IV., 115; Pharm. Ind.,

Cyclop. Agr.

Habitat.—A herbaceous plant cultivated, for its seeds, as a cold-season crop on the plains of India and frequently on the hills, as a summer crop, as in Baltistan, Kashmir, and Garwhal, &c, at an altitude of between 9,000 to 12,000 feet. Distributed to Western and Northern Asia and Europe. The Greek and Latin names of the plant are said by some writers to be "derived from Caria, the native country of the plant" (*Bird-*

CONDIMENT.
682

Per-
is now
lists of

C. angustum the existence of the name *Isirayati-sira*, that is, European *sira*, should not by itself be viewed as excluding the true Caraway from an

C. 682

The Caraway.

CARUM
Carui.

oriental origin since such a name might simply mean that in that part of the country it was first brought to the attention of the natives by the Europeans. Indeed, the facilities of trade offered by the Persian Gulf can easily be understood to have made the people of Bombay more familiar with an imported article than with a wild or even cultivated plant of the Panjáb Himálaya. Authors are about equally divided in the restriction of the word *zira* to Carum Carui on the one hand, and to Cuminum Cuminum on the other. (Conf. with C. nigrum.)

Dr Dymock says that Caraways are brought from the Red Sea Ports to Bombay where they are sold at Rs per pound. Dr Stewart alludes to a considerable trade from Afghánistan, Kashmir, and other parts of the Panjáb Himálaya to the plains of India. The imports of Caraway into Great Britain are about 20,000 cwt. a year and chiefly from Holland. It is also largely grown in Kent and Essex.

Oil—A valuable essential oil is obtained from the seeds, called Caraway Oil. This oil is colourless or pale yellow, thin, with a strong odour and flavour of the fruit. It is used in medicine and more extensively as a perfume for soaps. (*Spons'*)

Perfumery—Piesse, in his book on perfumery, remarks that the odorous principle obtained from the seeds by distillation, when dissolved in spirit, may be combined with lavender and bergamot for the manufacture of cheap essences in a similar way to cloves.

Medicine—As a medicine the dried fruit possesses stimulant and

CONDIMENT

TRADE.
683OIL.
684PERFUMERY.
685MEDICINE.
686

water

"Muhammadan writers describe the fruits as aromatic, carminative, and astringent, from them they prepare an eye-ash which is supposed to strengthen the sight, they are also used as a pectoral, and considered diuretic and anthelmintic. A caraway bath is recommended for painful swelling of the womb, and a poultice for painful and protruding piles." (*Dymock's Mat Med W Ind, 304*)

Fruit
687CHEMISTRY
688

absolutely deprived, perfectly pure carvone would no doubt prove no longer to possess the specific odour of the drug. By distilling it over sodium, it acquires a rather pleasant odour, its specific gravity at 15° C is equal to 0.861.

The Bishop's Weed.

CARUM
copticum.

MEDICINE

(*Waring's Bazar Med*) They are administered in flatulence, flatulent colic, atonic dyspepsia, and diarrhoea, and are often recommended for cholera. They are used most frequently in conjunction with asafœtida,

myr
and
an
aror
native doctors as a stomachic, emetic, and stimulant, and also by the veterinary practitioners in India in the diseases of horses and cows. Dr. Bidie is strongly in favour of the extended use of this medicine. "As a topical remedy it may be used with advantage, along with astringents, in cases of relaxed sore-throats. For disguising the taste of disagreeable drugs and obviating their tendency to cause nausea and griping, I know of no remedy of equal power." The seeds have come into special notice in England and Germany for the manufacture of *Thymol*, enormous quantities of which are now made and used as an antiseptic (*Smith*)

Thymol,
694OMUM.
695

flatulence and as an antispasmodic in hysterical pains. Of late, it has been extolled as a powerful antiseptic superior to carbolic acid (*Home*)

drunkenness and dipsomania, omum seems worthy of trial." (*Waring's Bazar Med*) Dr. Stocks was the first to draw attention to a crystalline substance sold in the bazars of the Deccan and Sind, known as *Ajwain-ka-phul*. This is prepared from the fruits of *Carum copticum* or forms spontaneously on the surface of the distilled water (*Pharm Ind*)

Chemical Composition.—The authors of the *Pharmacographia* say

CHEMISTRY.

(1856) to be identical with thymol, C_8H_8 , $\left\{ \begin{array}{c} C_8H_8 \\ C_8H_7 \end{array} \right\}$, as contained in

Thymus vulgaris

on, first rectified
the oil deposited
much or more in
to a cold some
We found the
somewhat larger
fete fusion. On
crystallizes when a

CARUM
copticum

The Bishop's Weed.

CHEMISTRY

"C. C, the
the same
however,
ol, either
alcohol,
specific gravity 0.830, and saturated with sulphuretted hydrogen, crystals
of $(C_{10}H_{14}C)_2SH_2$ are at once formed as soon as a little ammonia is
added." (Pharmacog)

Special Opinions — § "Stimulant and laxative. The white variety is
lactagogue" (Assistant Surgeon Nehal Singh, Saharanpore) "Have
used it to increase the flow of milk with no decided effect" (Surgeon
D. Picachy, Purneah.)

Food — The seed is used parched and powdered, or raw and entire

FOOD
Seed
689
Roots
690

(Assistant Surgeon Shib Chunder Bhattacharji, Chanda, Central Prov-
inces).

691

Carum copticum, Benth; Fl Br Ind, II, 682; Wight, Ic, t 566.

THE BISHOP'S WEED, LOVAGE, AJAYA SEEDS, ANYZAD,
Dutch; SISON, Fr.; AMEOS, Port.

Syn — AMMI COPTICUM, Boiss; LIGUSTICUM AJAWAIN, Fleming; L.
AJOWAN, Roxb; PTYCHOTIS COPTICA, DC., P AJOWAN, DC, SISON
AMMI, Jacq; BUNUM AROMATICUM, Linn

Vc

R₁

Med Hind, 172, 173 314; Dymock, Mat Med W Ind, 2nd Ed, 565,

OIL
692
MEDICINE
693

Black Caraway.

CARUM
Roxburghianum.

these seeds he gave the name *Carum nigrum*, without apparently having either seen the plant or ascertained anything more about them. Stewart seems to have gone into the subject for he reduces Royle's *C. nigrum* to *C. Carui*. In this view he appears to be supported by Mr. C. B. Clarke in the *Flora of British India*, since Royle is by that author quoted as having found the true caraway in Kashmir and Garwhal. In what has been already said under *C. Carui* this opinion has been supported, but at the same time it must be added that Dr. Dymock and many other writers continue to allude to a black form of caraway. Dr. Dymock says "*Sajira* or *Siah sirah* (Bomb.) has more slender and darker-coloured fruits than the true caraway, a transverse section shows a similar structure. The flavour approaches that of Cummin, and the Persian name which it bears signifies black cummin. It is probably the article described in Persian works on *Materia Medica* as *Kirmans* or black cummin."

698

aver
into
expo

Under *C. Carui* it has already been stated that a considerable trade is done between the North-Himalayan and trans Himalayan regions with the plains of India in what has been accepted as the true caraway. These two seeds are distributed all over India, the Europeans using the

forcibly draw attention to the fact that recent writers have, as it would appear, been confusing two very distinct seeds under one botanical name.

It is thus probable that the vernacular names given under *C. Carui* and *C. nigrum* (the former being the name of the true caraway and the latter of the black form) are not the same.

MEDICINE.
600
FOOD.
700
701

Carum Roxburghianum, Benth., *Fl. Br. Ind.*, II, 682, Wight, Ic., t. 567.

Ajmod, bodajamo Guj.
References — Roxb., *Fl. Ind.*, Ed. C. B. C., 273, Dals. & Gibs, Bomb., Fl.

CARUM
nigrum.

Black Caraway.

CHEMISTRY

"Thymol is more conveniently and completely extracted from the oil by shaking it repeatedly with caustic lye, and neutralizing the latter

"The oil of ajwain, from which the thymol has been removed, boils at about 172°, and contains cymene (or cymol) $C_{10}H_{14}$, which, with concentrated sulphuric acid, affords cymen sulphonic acid, $C_{10}H_{13}SO_3OH$. The latter is not very readily crystallizable, but forms crystallized salts with baryum, calcium, zinc, and lead, which are abundantly soluble in water. In the oil of ajwain no constituent of the formula $C_{10}H_{18}$ appears to be present, mixed with alcohol and nitric acid, it at least produces no crystals of terpin

"The residual portions of the oil, from which the cymene has been distilled, contains another substance of the phenol class different from thymol"

Special Opinions.—§ Sometimes used by the natives for colds, useless as far as my experience goes (*Surgeon Major C F McKenna, Cawnpore*). "Much used in flatulence diarrhoea, and with other drugs in dyspepsia. Very useful in flatulence and with dyspepsia, especially administered in powder mixed with other antispasmodics" (*Surgeon G Price, Shahabad*). "contains, and which is in Madras famine relief I don't think it was of a

dr (G B Madras). used in dyspepsia (Hospital Assis stomachic, mixed with black pepper and salt and taken in empty stomach, relieves flatulence and colic and promotes digestion" (*Assistant Surgeon Shub Chunder Bhattachary, Chanda, Central Provinces*). "The water distilled from the seeds is very useful as a carminative, and is largely used by the natives, being administered to newly born infants as a carminative and stimulant. T

ly used as a Central Prov mixtures for in powder, an to newly born vances) "A Negapatam)

W A Barren Belgaum, Bombay)

Food —The seeds are aromatic, and form an ingredient of the preparation known as *pan*

FOOD
696

697

Carum nigrum, ? Royle, *Him Bot*, 229.

BLACK CARAWAY

Sum —Stewart Baden Day " R - f " - C, n n c "

kirmānī, siyah sirah, PERS

References —*Pharm Ind*, 99, Baden Powell, *Pb Prod*, 351, Moodeen Sheriff, *Supp Pharm Ind*, 90, Dymock *Mat Med W Ind*, 305, S. Arjun, *Bomb Drugs*, 63, Birdwood, *Bomb Drugs*, 39

Habitat —Royle mentions that seeds under the name of *Zeera seeah* are imported from Kunawar, and that these are "a kind of caraway" To

Cloves.

CARYOPHYLLUS
aromaticus

593 U C Dutl, Mat Med Hind, 154 307, Dymock, Mat Med

Habit.

in the 12th year, when the average annual produce may be estimated at 6-7lb of marketable fruit from each tree. There is usually a crop every year, but in Sumatra the trees often bear only twice in 3 years. When past its prime, the tree has a ragged appearance. Its existence in Sumatra is supposed to be limited to a duration of about 20 years, except in very superior soil when the tree sometimes bears for 30 years. At Amboyna it does not bear years. Old trees to through it very a winds. The harvesting of the flower buds (cloves) commences immediately they assume a bright red colour. The best and

matting near a slow wood fire, and very rarely they are scalded in hot water before smoking. They are ready for packing when they break easily between the fingers" (*Spons' Encycl*)

OIL
707

of spirit

Description of the Drug — "The varieties of cloves occurring in commerce do not exhibit any structural differences. Inferior kinds are distinguished by the colour of the flower buds, which are bright red and

CARYOPHYLLUS
aromaticus

Cloves

MEDICINE
702

Habitat —A herbaceous plant extensively cultivated throughout India, from Hindustan and Bengal to Singapore and Ceylon

Medicine —The seeds of this species are useful in hiccup, vomiting, and pain in the bladder. They form an ingredient of carminative and stimulant preparations, and are useful in dyspepsia.

Special Opinions —§ 'Carm native. It is an essential ingredient of native cookery and is generally called *Randhuni*." (*Assistant Surgeon Shib Chunder Bhattachary, Chanda Central Provinces*)

FOOD
Seeds

703

Leaves

704

Food —Often raised in gardens during the cold season for the seed which is used in flavouring curry, also used by the Europeans as a substitute for parsley (*Royle*). Extensively cultivated in Gujarat (*Lisboa*). Leaves though of an unpleasant smell are now and then used by Europeans as a substitute for parsley (*Voigt*).

705

Carving, Fancy work, Images, &c —

Timbers used for —

Berberis nepalensis, *Spreng* (useful for inlaying)

Buxus sempervirens *Linn* (carving)

Cedrela Toona, *Roxb* (carving)

Celastrus spinosus, *Royle* (carving and engraving)

Chukrasia tabularis, *Adr Juss* (carving)

Cocos nucifera, *Linn* (fancy work)

Crataeva religiosa, *Forst* (models)

Cupressus torulosa *Don* (images)

Dalbergia cultrata, *Grah* (carving)

D latifolia, *Roxb* (carving and fancy work)

D Sissoo *Roxb* (carved work)

Diospyros Ebenum, *Konig* (used for inlaying)

D melanoxylon, *Roxb* (fancy work and carving)

Euonymus grandiflorus, *Wall* (carving)

E. Hamiltonianus, *Wall* (carving into spoons)

Givotia rottleriformis, *Griff.* (carving figures)

Gmelina arborea, *Roxb* (carving images)

Hardwickia binata, *Roxb* (ornamental work)

Holarrhena antidysenterica, *Wall* (carvings)

Kydia calycina, *Roxb* (carving)

Melia Azadirachta, *Linn* (idols)

Pistacia integerrima, *J L Stewart* (carving, ornamental work)

Premna tomentosa, *Willd* (fancy work)

Santalum album, *Linn* (carving)

Stephegyne parvifolia, *Korth* (carved articles)

Symplocos crataegoides, *Ham* (carving)

~

idols)

Wrightia tinctoria, *R Br* (carving)

W. tomentosa, *Rom & Sch* (carved work)

CARYOPHYLLUS, *Linn*, *Gen Pl*, I, 719

706

Caryophyllus aromaticus, *Linn*, *DC Prodr*, III, 262.

CLOVES

[MYRTACEÆ

Syn.—*EUGENIA CARYOPHYLLATA*, *Thunberg*

Ve

.

Referenc

Pl C

Ind,

Ed,

m, J,

18rm,

15th,

d, I,

C. 706

Cloves.

CARYOPHYLLUS
aromaticus.

503, U. C. Dutt, *Mat Med Hand*, 1864, 307; *Dymock, Mat. Med*
W. Ind., 2nd Ed., 328, O'Shaughnessy *Rep.*, 1820
Pl and Drugs of Sind, 1821,
Bazar Med., 41, *S. Arjun*,
Pr., 35, *Lisbon, U. Pl of B. Ind.*
34; Spens, Encyclop., 1807.
Treasury of Botany, Asiat. Res.

Habitat.—A native of the Moluccas. Cultivated in Southern India. The Dutch tried to restrict its cultivation to the Island of Amboyna, but in the course of time it got introduced into India and other tropical countries. The flower-buds of this plant yield the cloves of commerce.

Cultivation and yield.—The tree naturally selects a volcanic soil, and a sloping position. The Dutch tried to restrict its cultivation to the Island of Amboyna, but in the course of time it got introduced into India and other tropical countries. The flower-buds of this plant yield the cloves of commerce.

The tree naturally selects a volcanic soil, and a sloping position. The Dutch tried to restrict its cultivation to the Island of Amboyna, but in the course of time it got introduced into India and other tropical countries. The flower-buds of this plant yield the cloves of commerce.

When past supposed to be limited to a duration of about 20 years, except in very superior soil, when it may not bear till the 12th-15th years. Hence it is not

winds. mences immediately they most usual plan is to place tating the operation in t however, they are beaten off by long bamboos, and caught in cloths spread below. The plucked cloves undergo a process of which confer the mple ex but ele with m hot w2 easily between the fingers" (*Spens' Encycl*)

Oil.—Every part of the plant abounds with buds and flower-stalks. The process is a colourless or a of cloves. It easily, sively made use of often adulterated with dissolving oil of clove of spirit.

Description of the Drug.—"The varieties of cloves occurring in commerce do not exhibit any structural differences. Inferior kinds are distinguished by being less plump. The cloves met with in the Inc Those suited for medical use are

OIL.
707

CARYOPHYLLUS
aromaticus.

Cloves.

DESCRIPTION
OF EHT
DRUG

spicy, pungent taste, and should emit a trace of oil when pressed with the nail (*Waring's Bazar Medicines*). "The Americans have introduced into commerce an imitation in a solution of true natives, are largely of mixed spice and cloves or fruits are *Encycl*, 1808)

MEDICINE
Buds
708

Medicine —The dried flower-buds which constitute the cloves of com-

grain pill made of equal parts of jalap and powdered cloves generally opens the bowels. "Cloves are much used in Hindu medicine, as an aromatic and stimulant. They are regarded as a light cooling stimulant and is an excellent effect in debility, loss of appetite, and in convalescence after fevers. "The oil, *Lavanga-tela*, is used externally in rheumatic pains,

tonic, and digestive qualities. They have a curious superstition to the effect that one male clove eaten daily will prevent conception" (*Dymock's Mat Med W Ind*, 329)

Chemical Composition —"Few plants possess any organ so rich in essential oil as the drug under consideration. The oil known in pharmacy as *Oleum Caryophylli*, which is the important constituent of cloves, is obtainable to the extent of 16 to 20 per cent. But to extract the whole, the distillation must be long continued, the water being returned to the same material

"The oil is a colourless or yellowish liquid with a powerful odour and taste of cloves, sp gr 1.046 to 1.058. It is a mixture of a hydrocarbon and an oxygenated oil called *Eugenol*, in variable proportions. The for-

aceous odour.

of eugenol is given by the formula $C_6H_5\left\{ \begin{matrix} \text{C}_6\text{H}_5 \\ \text{OH} \\ \text{CH CH CH}_3 \end{matrix} \right\}$. It belongs

Cloves.

CARYOPHYLLUS
aromaticus.

to the phenol class, and has also been met with in the fruits of *Pimenta officinalis*, in the Bay leaves, in *Canella bark*, in the leaves and flower-buds of *Cinnamomum zeylanicum*, and in Brazilian clove bark (*Dicypellium caryophyllatum*, Aees)

MEDICINE

little Salicylic acid, $C_6H_4\{COOH\}$, which may be removed by shaking

ss, inodorous substance,
bained it in small quan-
uch we had previously
quantities of alcohol &

Mylius (1873) obtained from it, by nitric acid, crystals of *Caryophyllinic Acid*, $C_{20}H_{32}O_4$

"*Carmufellie Acid*, obtained in colourless crystals, $C_{12}H_{20}O_{10}$, in 1851, by Muspratt and Dansan after digesting an aqueous extract of cloves with nitric acid, is a product of this treatment and not a natural constituent of cloves

relieve irritation of the throat and hacking cough' (*Brigade Surgeon G H Thorn*)

(Assistant
in the
Cochin)

Food —
hot spice th

Foreign Trade in Cloves

Year	IMPORTS		EXPORTS AND RE-EXPORTS	
	Quantity	Value	Quantity	Value
	lb	Rs	lb	Rs
1850-81	2 583,852	14,40,739	1,064 115	6,20,331
1881-82	2 653 836	12 64 254	735,892	3 40,879
1882-83	3 878,232	13 09 518	1,230,104	3 74 857
1883-84	3 893,159	10 61,206	1,068 906	2 75 564
1884-85	4,791,000	11 09,841	1,649 040	3 67 249

FOOD.
709
TRADE.
710

CARYOTA
urens

TRADE

Sago Palm

Imports for 1884 85

Pres dency to wh ch mported	Quant ty	Value	Country from wh ch mported	Quantity	Value
	lb	R		lb	R
Bombay	4 598 4 9	10 50 680	Zanz bar	4 776 842	11 05 877
Bengal	190 526	53 283	Aden	11 767	2 908
Br tsh Burma	1 283	425	Other Countries	2 397	1 056
Mad as	773	453			
TOTAL	4 791 006	11 09 841	TOTAL	4 791 006	11 09 841

Exports for 1884 85

P es dency from wh ch expo ted	Quant ty	Value	Country to wh ch expo ted	Quant ty	Value
	lb	R		lb	R
Bombay	1 618 465	3 55 692	Un ted K ngdom	1 112 224	2 32 739
Bengal	29 65	10 090	Ch na—Hongkong	349 698	84 966
Madras	1 390	1 462	Stra ts	124 01	33 543
S nd	20	5	Turkey in Asia	15 137	3 887
			Aden	7 000	1 790
			F ance	7 000	750
			Other Count es	33 830	8 574
TOTAL	1 649 040	3 67 249	TOTAL	1 649 040	3 67 249

Very little can be said regarding the present position of the new industry of cultivating cloves in South India. Good samples were, however shown at the Colonial and Indian Exhibition.

CARYOPTERIS, Bunge Gen Pl, II 1157

Caryopteris Wallichiana, Schauer DC Prodr XI 625;

[VERBENACEÆ

Vern.—*Moni mohani* KUMAON *Skechin* NEPAL *Malet* LEPCHA

References.—*Brand s For Fl* 370 *Gamble Man Timb* 299

Habitat.—A large shrub with thin grey papery bark peeling off in vertical strips met with on the outer Himalaya from the Indus to Bhutan ascending to 3000 feet.

Structure of the Wood.—Dark grey, moderately hard with the scent of cherry wood.

CARYOTA, Linn Gen Pl III 918

Caryota urens, Linn Gamble Man Timb 420 PALMÆ

KNOWN IN BOMBAY AS THE HILL PALM also SAGO PALM

Vern.—*Mar Hind* *Rungbong s mong* LEPCHA *Baya flawar* ASS

Salopa URIYA *Mari ka phâr* DEC *Bherawa beri* *bh ris mahad beri*

CARYOTA
URENS
711

Sago Palm.

CARYOTA
urens.

පළමු පිටුවේ පිටු 1-2 ක් පමණ පමණි. අනෙක් පිටුවේ පිටු 3-4 ක් පමණ පමණි.

පිටුවේ පිටු 1-2 ක් පමණ පමණි. අනෙක් පිටුවේ පිටු 3-4 ක් පමණ පමණි.

පිටුවේ පිටු 1-2 ක් පමණ පමණි. අනෙක් පිටුවේ පිටු 3-4 ක් පමණ පමණි.

References.—Roxb., *Fl. Ind.*, Ed. C.B.C., 668; Brandis, *For. Fl.*, 550, *Kurz, For. Fl. Burm.*, 11, 530; Vauel, *Hort. Sub. Cal.*, 637; Thwaites, *En. Ceylon Fl.*, 329; Dalt. & Gibs., *Bomb. Fl.*, 278; *Pharm. Ind.*, 248;

පිටුවේ පිටු 1-2 ක් පමණ පමණි. අනෙක් පිටුවේ පිටු 3-4 ක් පමණ පමණි.

පිටුවේ පිටු 1-2 ක් පමණ පමණි. අනෙක් පිටුවේ පිටු 3-4 ක් පමණ පමණි.

Habitat.—A beautiful palm, with smooth, annulated stem, met with in the forests of the western and eastern moist zones. On the Western Ghats, it extends to near Mahableshwar. In the Settlement Reports of the Chanda district it is stated that this palm abounds in the south-eastern corner of Aheree, and might with advantage be extended to all parts of the district, for it thrives well wherever it is planted. It is common in Burma, Bengal, and Orissa, ascending in Sikkim to 5,000 feet.

Fibre.—"The leaves give the *Kittul Fibre*, which is very strong and is made into ropes, brushes, brooms, baskets, and other articles; the fibre from the sheathing petiole is made into ropes and fishing-lines" (*Gamble*), and is said to be suitable for paper manufacture.

At the Colonial and Indian Exhibition (1886-87) much interest was taken in *salapa* fibre sent from Orissa, Burma, and Kolaba in Bombay. A corset manufacturer applied at the office of the Indian section for a fibre which might take the place of whalebone in corset-making. He was shown the *salapa* (*kittul*) fibre and also the similar cord like fibres from the interior of the stems of the cocoanut and palmyra palms. It

FIBRE.
712

පිටුවේ පිටු 1-2 ක් පමණ පමණි. අනෙක් පිටුවේ පිටු 3-4 ක් පමණ පමණි.

පිටුවේ පිටු 1-2 ක් පමණ පමණි. අනෙක් පිටුවේ පිටු 3-4 ක් පමණ පමණි.

පිටුවේ පිටු 1-2 ක් පමණ පමණි. අනෙක් පිටුවේ පිටු 3-4 ක් පමණ පමණි.

පිටුවේ පිටු 1-2 ක් පමණ පමණි. අනෙක් පිටුවේ පිටු 3-4 ක් පමණ පමණි.

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පිටුවේ පිටු 1-2 ක් පමණ පමණි. අනෙක් පිටුවේ පිටු 3-4 ක් පමණ පමණි.

පිටුවේ පිටු 1-2 ක් පමණ පමණි. අනෙක් පිටුවේ පිටු 3-4 ක් පමණ පමණි.

Ceylon. At the Colonial and Indian Exhibition he pointed out to the writer a sample of the much inferior *kittul* like fibre from *Arenga saccharifera* (see A. 1336) as the *kittul* he had formerly seen as sent from India. He admitted that the sample of *salapa* shown him at the Exhibition was

C. 712

CARYOTA
urens

Sago Palm

Tomentum
stem fibres

as good as any he had ever seen from Ceylon, and seemed confident a large trade could be done in the Indian fibre

It is commonly reported that in Ceylon the black fibre from the leaf-stalks is manufactured into ropes which are of great strength and

MEDICINE
713

pa is is employed as a bowstring or as a fishing line (see B 067) (*Royle Fib Pl*)

Medicine — "An excellent spirit is obtained by the fermentation and distillation of the toddy obtained from this elegant palm, which is not uncommon on the west coast of the Madras peninsula. It is well adapted for pharmaceutical purposes. "A glass of the freshly drawn toddy, taken early in the morning, acts as a laxative" (*Pharm of India*). 'The nut is used as an application to the head in cases of hemicrania, from an idea of the supposed efficiency of the half nut in curing the affected half of the head' (*S' Arjun, Bombay Drugs*)

FOOD
714

Food — Roxburgh writes "This tree is highly valuable to the natives of the countries where it grows in plenty. It yields them, during the hot season, an immense quantity of toddy or palm wine. I have been informed that the best trees will yield at the rate of 100 pints in the 24 hours. The sap in some cases continues to flow for about a month. When fresh, the toddy is a pleasant drink, but it soon ferments and when distilled becomes arrack, the gin of India. The sugar called jagery is obtained by boiling the toddy. The pith or farinaceous part of the trunk of old trees is said to be equal to the best sago, the natives make it into bread, and boil it into thick gruel, these form a great part of the diet of these people and during the late famine (1830?), they I have reason to believe this substance eaten the gruel and think it fully get from the Malay countries

(1830?)

'The trees are tapped when they are from fifteen to twenty five years old. Besides bruising and binding it, the spathe, which is called *kote*, is heated to make the juice flow. Every three or four days a white

TIMBER
715

'value of the juice the big trunked palm differs little from the palmyra. Since 1879 when the tree tax was raised from 15 *6d* to 6s (*annas 12 to 83*), the number of trees tapped has greatly fallen" (*Bomb Gaz* (Kolaba), XI, p 30)

and dur-
he wood
conduits,
"Is in

GENERAL USE FOR FIELD WORKS (*Bomb Gaz*, LV, 1, 65)

716

Cascarilla bark, the bark of *Croton Eluteria*, EUPHORBIACEÆ

A native of the Bahamas. The bark is imported into India

C. 716

Casearia

CASEARIA
tomentosa.

CASEARIA, Jacq., Gen Pl, I, 796

Casearia esculenta, Roxb, Fl Br Ind, II, 592. SAMYDACEÆ

717

Syn — C LÆVIGATA, Dals, in Hooker's Jour Bot, IV, 107, C CHAM
PIONII and C ZEYLANICA ThwaitesVern — *Kunda jungura*, TEL, *Wal waraka*, SINGReferences — Roxb, Fl Ind, Ed CB C, 377, Drury, U Pl 119, Dals
& Gibs, Bomb Fl, 11, Thwaites, En Ceylon Pl, 19

Habitat —

Coorg, comr
to SingaporeMedicine — "The roots are purgative, and as such used by the hill
people" (Roxb)

Food — "The leaves are eaten in stews by the natives" (Roxb)

MEDICINE

718

FOOD

719

720

C. glomerata, Roxb, Fl Br Ind, II, 591

Vern — *Lurjur*, SYLHET, *Burgonli*, NEPAL, *Sugvat*, LEPCHAReferences — Roxb, Fl Ind, Ed CB C, 376, Kurr, I, 530, Gamble,
Man Timb, 205Habitat — A shrub or (in the interior of Sikkim) a tree 20 to 30 feet
in height Frequent in Bhutan and on the Khasia Hills at an altitude
of 3,000 feetStructure of the Wood — Yellowish white, moderately hard, rough,
weighing between 45 and 48 lb per cubic foot Used for building,
charcoal, and occasionally for tea boxes

TIMBER.

721

C. graveolens, Dals, Fl Br Ind, II, 592

722

Vern — *Chilla*, *naro*, *olosh*, *kathera*, *pimpri*, HIND, *Rari*, KOL, *Beri*,
Kharwar, *Newri*, SANTAL, *Girchi*, *tundra*, COND, *Rawat*, KURKU,
Moda, MARReferences — Brandis, For Fl, 243, Gamble, Man Timb, 205, Dals &
Gibs, Bomb Fl, 11, Lushoo, U Pl of Bomb, 81 and 265Habitat — A shrub or small tree, 20 feet in height, found in Garhwál
and Kumaon, Sikkim at an altitude of 1,500 feet, Deccan Peninsula and
in Burmagh, weight
purpose
sion of the

TIMBER

723

DOMESTIC

724

C. tomentosa, Roxb, Fl Br Ind, II, 593, Wight, Ic, t 1849.

725

Syn — C. *Andamensis*, Dals, *Andamensis*, Dals

V.

72, 243;
Lushoo,
25, En

CEYLON PL, 19

Habitat — A shrub or small tree, attaining a height of 25 feet, common
throughout India and CeylonMedicine — The bark is bitter and used as an adulterant for the
(*Mallotus philippinesis* or) *Kamela* powder "The pounded fruit yields a

MEDICINE

726

CASSIA
Absus

Senna

MEDICINE

milky, acrid juice employed to poison fish" (*Brandis*) The leaves are used in medicated baths and the pulp of the fruit is a very useful diuretic (*Lindley*)

Special Opinion — § "Bark applied externally in dropsy" (*Rev A Campbell Santal Mission, Bengal*)

TIMBER
727

Structure of the Wood — Yellowish white, moderately hard, rough, close-grained, we ght 41lb per cubic foot, used to make combs,

Cashew-nut. See *Anacardium occidentale*, *Linn*, ANACARDIACEÆ.

Cassareep, and

Cassava Bread, and Tapioca, see *Manihot utilisissima*, *Pohl*, EUPHORBIACEÆ

CASSIA, *Linn*; *Gen Pl*, I, 571

The word Cassia is taken from the Latin and the Greek *Κασσία*, and from this has been derived CASSIA the Italian, and CASSE, the French. In the Scriptures two or three different things appear all to be rendered as Cassia. The genus is of considerable importance from a medical point of view

728

Cassia Absus, *Linn*, *Fl Br Ind* II, 265

Vern — *Tashmisaj chashmisaj* PERS. *chashum cheshmak* PERS., *Mulaypaj-virai karunka nam vittulu* TEL. *Karin kolla M Chimar* or *chamr, chindl*, GUJ SING

References — *Roxb Fl Ind Ed C B C* 351 *Gamble Man Timb*, 135 *Thwaites, En Ceylon Pl* 96 *Stewart Pb Pl* 61 *Aitchison, Cat Pb Pl* 51 *Pharm Ind* 78 *Moodeen Sherff Supp Pharm Ind* 92 *Dymock Beng Dispens* 30 *account of Sind B Drugs* 45 *Drury Him Dist* 731 *Treasury of Botany* 231

Habitat — An erect annual 1-2 feet high having grey, bristly, viscose hairs. Found growing at the foot of the Western Himālaya and from thence distributed to Ceylon

History — The seeds of this plant were used by the ancient Egyptians in the treatment of ophthalmia, and through them the Roman and the Greek, and from the latter the Muhammadan writers became aware of their properties. Dioscorides speaks of them under the name of *Akakalis*. Their

MEDICINE
Seeds.
729

trial to this treatment, and the results were on the whole confirmatory of its alleged efficacy. Dr. G Smith, Superintendent of the Eye Infirmary at Madras, in his report, characterises it as a dangerous

Alexandrian Senna of Commerce

CASSIA
alata.

MEDICINE.

Extract.
730

application in catarrhal ophthalmia and granular lids, adding that its application causes great pain. As met with in the bazárs, these seeds are of a black, shining colour, somewhat flat, of an oval or oblong form, pointed at one extremity, about one-sixth of an inch long, having a bitter taste" (*Pharm Ind*). They are very bitter, somewhat aromatic and mucilaginous, and, as such, have been found very useful in mucous disorders. An extract is prepared from them and used to purify the blood. Dr. Irvine, in his *Materia Medica of Patna*, says that the receptacle of the seed possesses stimulant and diuretic properties (dose 5 grains to 1 scruple). According to some authors, a plaster made from the seeds is a useful application to wounds and sores, especially of the penis.

Special Opinions — § "Seeds are found efficacious in ring-worm" (*Surgeon C F W Meadows, Burrisal*). "Cathartic, dose $\frac{1}{2}$ to 3 drachms, used in habitual constipation, or in constipation caused by pregnancy, with confection of rose and liquorice, have proved effective. In dyspepsia, flatulent colic, and bilious headache, it is given as a compound powder, containing ginger, black rock-salt, amla and bury, and chotty hus" (*Hospital Assistant Abdulla, Civil Dispensary, Fubbulpore*).

According to Dr. Dymock, the Bombay supply comes from Sind and Cutch, value, R4 a Surat maund of 37½ lb.

Cassia acutifolia, Delile

European
Senna
731

THE ALEXANDRIAN SENNA of Commerce.

Syn.—C SENNA, β Linn. C LANCEOLATA, Nectoux, non Forsk. nec II & A, C LENITIVA Bisch. SENNA ACUTIFOLIA, Baika. See also the remarks under C LANCEOLATA, Forskhal.

Habitat — A native of Nubia (at Sukkot, Mahas, Dongola, Berber), of Kordofan and Sennaar, and other parts of Africa.

For Indian Senna see C. angustifolia, C. Burmanni, and C. obovata.

C. alata, Linn., Fl. Br. Ind., II, 264.

732

Vern.—*...*

TAN
Bark.
733

(*Dyes and Tans*) The numerous samples of this bark, shown at the late Colonial and Indian Exhibition, were highly commended by the tanners.

MEDICINE
Leaves.
734

CASSIA
angustifolia

Indian or Tinnevely Senna.

Tincture.
735

Stewart, and Dr Rean. As a general rule, they appear to be more effectual in recent cases than in those of long standing. The Bengal Pharmacopœia contains the following formula for an ointment of the leaves, of the ncor node, the In

many cases it is productive of excellent effects. The leaves taken internally act as an aperient. Mr. J Wood reports that a tincture of the dried leaves has been found to operate in the same manner as senna, and Dr Pulney Andey states that an extract prepared from the fresh leaves is a good substitute for extract of Colocynth. It is desirable that further trials should be made with them."

Roxburgh remarks that, according to the Telinga and Tamil physicians, the leaves cure all poisonous bites as well as venereal affections, and

Roots
736

common salt" (Surgeon Major J. M. Zorab, Balasore). "Expectorant, tonic, and astringent, used as a mouth wash in stomatitis." (Surgeon-

737

Cassia angustifolia, Vahl, Fl Br Ind, II, 264

INDIAN OR TINNEVELLY SENNA

Syn.—C LANCEOLATA, Roxb., W & A, and (?) Wall, but not C LANCEO

Indian or Tinnevelly Senna.

CASSIA
angustifolia.

shóna makhi, MAR , Natlu nila virai nila virai, nila-vakai TAM , Nela
tangédu TEL , Nila vaka MALA , Nelavarike KAN , Sa ra kola nilá
vari, nela-vari SING , Puve káin yoe, BURM

References — D U S A E S B A I D I S H A K A S A

many parts of India. The *Flora of British India* says *C. angustifolia* 'has no claim to be considered indigenous to India.' *C. lanceolata*, Forsk., is a native of Arabia. It seems probable that the mistake made by Dr Brandis gave origin to the statement (see *Pharmacographia*, also *Bentley and Trimen, Med. Pl.*) that *C. angustifolia* is indigenous to Sind and the Panjáb.

The cultivated plant as met with in India is the Tinnevelly Senna of commerce and the uncultivated the Bombay Senna or *Senna Mekki* or *Sana miki* Sana maki of the East. The last mentioned is imported into India from Arabia. In Bombay it is cultivated at Poona to supply the requirements of Government Hospitals and not as an article of commerce. Stoeks say it is grown in Sind.

Botanic Diagnosis—This species is closely related to the preceding, but the leaflets are usually 5-8 jugate, are narrower, being oval, lanceolate, tapering from the middle towards the apex, they are longer, often nearly 2 inches long, and are either quite glabrous or furnished with a very scanty pubescence. The legume is narrower (7-8 lines broad), with the base of the style distinctly prominent on its upper edge.

Description of the Drug—This plant thus affords two of the commercial forms of senna.—

1st TINNEVELLY SENNA—This is the leaf obtained from the plant carefully cultivated in South India and (at Poona) in Bombay. Owing to greater care in its collection, Tinnevelly senna is of better quality than the Arabian article. The leaves are also larger, being 1-2 inches long of

Tinnevelly.
738

Dr Dymock says that large quantities of Tinnevelly senna are now sent to Bombay and that so successfully does this Indian article compete in the market, that the importation of Arabian senna is rapidly declining, Tinnevelly senna being exported to Europe in its place.

Arabian.
739

CASSIA
angustifolia

Arabian Senna

MEDICINE
Leaves
740

Medicine —Senna was first made known by the Arabs in the ninth century it is extensively employed as a simple and active purgative. The Alexandrian is generally regarded as more powerful than Tinnevely and the Arabian or Moka much inferior to either of these. The objec-

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1
a
a
g
of potash, tartrate of potash or sulphate of magnesium along with an
Dr
"and
at the

Dr Waring (*Bazar Medicines*) says "The imported senna met w th in

CHEMISTRY

decoction for fevers and also to cattle

Chemical Composition —The purgative property is considerably increased by combination with bitters. This fact has been confirmed by many observers. The purgative properties are due essentially to a glucoside acid named *Cathartic Acid*. This which is almost insoluble in ether or chloroform. In senna and magnesium and in this form insoluble in alcohol. The objective decoction, although the senna yields rapidly one or minutes after partaking the by being reddened on the

addition of ammonia. Senna taken by wet nurses with equal rapidity influences the milk, purging the suckling infant. If injected into the blood senna acts as a cathartic.

For further particulars see "Alexandrian Senna" under *C. acutifolia*, and for Senna substitutes see *C. obovata*.

purchased at one anna a lb" (*Surgeon Major W Dymock, Bombay*)

Powdered leaves are used in secondary syphilis" (*Surgeon Major F L Ratton M D Salem*) "Senna leaves are always purchased in the bazars and esteemed for their cathartic properties" (*A Surgeon*) "An efficient purgative commonly taken by the natives as a cold infusion, causes griping and abundant flow of mucus" (*Assistant Surgeon Shib Chunder Bhattacharya, Chanda Central Provinces*) "Not much used in these days" (*Brigade Surgeon S M Shircore, Moorsheedabad*)

C. 740

Tanner's Cassia

CASSIA
auriculata

Cassia auriculata, Linn, Fl Br Ind, II, 263

741

THE TANNER'S CASSIA

Syn — SENNA AURICULATA, Roxb

Vet

Ref

Exhib

Habitat—A tall shrub with the virgate branches and under side of the leaves finely grey downy. Wild in the Central Provinces, the Western Peninsula South India, and Ceylon, often planted elsewhere.

Gum—It is said in *Spons' Encyclopadia* to yield a medicinal resin, very scarce, but Dr Dymock informs the writer he has never seen this supposed resin although he has frequently handled the bark. In Bengal a brownish sap hardens on the surface of wounds on the bark, this may be the so-called resin.

Tan and Dye—The bark is one of the most valuable of Indian tans, and is also, like myrabolans, used to modify dyes. It is said to give a buff colour to leather. Bidie remarks that "when the Government Tannery existed at Hunsur, this bark was used almost exclusively for tanning purposes." This bark was highly commended by the Tanners who attended the conference on tanning materials held at the Colonial and Indian Exhibition in London. It was regarded as a little too dark-coloured but the leather shown as tanned by it was admired. It was recommended that an effort should be made to have an extract prepared from this bark for export to Europe similar to Cutch. Mr Wardle in his recent report says "The bark does not produce much dye, only light

GUM
742DYE & TAN
Bark
743

matter, apparently not used economically

§ "Skins of animals are tanned by soaking them in water in which the bark of this shrub has been infused for several days" (*Honorary Surgeon P Kinsley, Chicacole, Ganjam*)

Fibre—Specimens of the bark were sent to the Calcutta Exhibition

Flowers
744FIBRE
745

this plant (Roxb)

C. 745

CASSIA
Burmannii.

The Tanner's Cassia.

MEDICINE

Seeds

746

Medicine—"The SEEDS of this common Indian plant, like those of

Bark

747

obtusely pointed at one extremity, and varying in colour from brown to dull olive-green they are tasteless and inodorous. The BARK is highly astringent, and Dr Kirkpatrick states (*op. cit.*, No 475) that he has employed it in the place of oak bark for gargles, enemas, &c., and found it a perfect substitute for the imported article. Both the seeds and bark appear worthy of further trials. A spirituous liquor is prepared in some parts of India by adding the bruised bark to a solution of molasses, and allowing the mixture to ferment" (*Waring, Pharm Ind.*, pp 78, 79)

Leaves

748

A decoction or infusion of the LEAVES of this plant is much esteemed as a cooling medicine by the Singhalese, and also as a substitute for tea (*Thwaites Murray*). Ainslie says that the Vytians reckon the

Plant

749

into the eyes

Special Opinions—§ "Bark substituted for oak-bark. Seeds powdered a good local application for ophthalmia" (*Apothecary Thomas Ward, Madanapalle, Cuddapah*). "Antiscorbutic, antibilious, *trifala*, which is made up of dry *awala*, *gall*, and *hirada*, is used as a diuretic and also as an expectorant" (*Surgeon W Barren, Bhuj, Cutch*). "The whole plant, or any part of it, is used in diuresis and diabetes with fair results. The decoction of the flower-buds is an agreeable form in which it is taken in

Flower-buds

750

Bangalore)

FOOD

Leaves,

751

Food.—The leaves are eaten as a green vegetable in times of famine (*Lisboi*).

Domestic Uses.—The branches are largely used by natives as tooth-brushes, and are esteemed as preferable to those of any other plant for this purpose. The root is of great use to workers in iron for tempering the metal (*Ainslie*).

DOMESTIC

Tooth brushes

752

Root

753

754

Cassia Burmannii, *Wight* (in *Madras Jour.*, VI, t 5)

Vern.—The same as those of *C. angustifolia*, *Vahl*

References.—*Boiss. F. Ind. C. Ind. H. Ind. M. Ind. N. Ind. O. Ind. P. Ind. Q. Ind. R. Ind. S. Ind. T. Ind. U. Ind. V. Ind. W. Ind. X. Ind. Y. Ind. Z. Ind.*

Habitat.—A glabrous, shrubby plant, 1-4 feet in height, often procumbent, pod much curved into a kidney-shape, with a crest in the middle of the valve opposite each seed, leaflets 4-8 pairs. Frequent in the Panjáb (Salt Range, ascending to 2,500 feet, where it is known as *sanna*) and Trans-Indus (where it is called *sfjan*), according to Brandis; it

C. 754

CASSIA
Fistula.

The Purging Cassia.

GUM.
757

Exhibition from Travancore.

DYE AND TAN
Bark
758

Dye and Tan —The bark is used in tanning, chiefly along with Terminalia. Dr. McOann reports that in the district of Lohárdagá, in Bengal, a light-red dye is obtained from the bark, with alum as a mordant, 2 chittacks of bark with 2 tolas of alum being boiled together. The colour is deepened by the use of pomegranate rind. Mr. Wardle reports that the bark contains only a very small quantity of colouring matter. It yielded yellowish drab with tusser silk, light fawn with corah and eri silks, and light yellow-brown with wool. The wood ash is used as a mordant in dyeing. In Dacca and in Cuttack the bark is used as a tan. McOann describes the process of tanning as follows: "Skins, after being treated with lime and cleaned, are soaked in the water, and then are pounded in tannin; for 24 hours (now Sir E. Bynor). Experiments were tried at the Government factory, the result being that *amaltas* bark was pronounced a very valuable tanning material. The North-Western Provinces do a small trade in exporting the *amaltas* bark."

MEDICINE
Pulp
759
Root bark
760Flowers
761
Bark.
762
Leaves
763
Root
764

CASSIA
obovata.

Country or Italian and Jamaica Senna.

772

Cassia lanceolata, Forskhal

This species is, by the majority of authors, viewed as quite distinct from either *C. acutifolia* or *C. angustifolia*. It is a native of Arabia, and doubtless to a certain extent is used as a substitute or adulterant for the Mecca senna. It differs chiefly from *C. acutifolia* in having glandular petiolets, the plants are, however, very nearly allied, and, as Forskhal's description is anterior to Dehlie's account of *C. acutifolia*, both might be reduced to one, which in that case would have to receive the name *C. lanceolata, Forskhal*. Most Indian authors give *C. lanceolata, Forskhal*, but in the writer's opinion incorrectly, as a synonym for *C. angustifolia, Vahl*.

C. Lignea See *Cinnamomum Tamala, Nees*, LAURINEÆ.

773

C. marginata, Roxb, Fl Br Ind, II, 262, Wight, Ill, t 83Syn — *C. ROXBURGHII DC*Vern — *Urimidi ushiamen, Tel, Ngoomee, BURM, Ratoo-maa SINO*References — *Roxb Fl Ind Ed C B C, 350 DC Prod II 499, W & A Prod 286 Gamble, Man Timb, 137, Thwaites, En Ceylon Pl, 95 Bedd, Fl Sylva, t 180*

Habitat — A small deciduous tree, with deeply cracked brown bark, found in the Western Peninsula, and in Madras Ceylon and Burma (Thoungyeen forests)

TIMBER

Structure of the Wood — Heartwood light brown very hard. The wood is well adapted for turning, naves of wheels, and handles of tools

774

775

C. mimosoides, Linn, Fl Br Ind, II, 266Vern — *Patwa ghas, SANTAL*

Habitat — Grows on the Himalaya, ascending 5000 to 6000 feet in Kumaon, and on the hills of Bengal and of the Khasia, to Ceylon and Malacca

MEDICINE

Root

Medicine — §" Root given for spasms in the stomach (*Rev A Campbell, Santal Mission, Pachamba*)

776

777

C. nodosa, Ham, Fl Br Ind, II 261Vern — *Gnu-theing, BURM*References — *Mason's Burm, 404 770*

Habitat. — A common species in the Eastern Himalaya, Manipur, and Burma

It has the properties assigned to most of the wild species

778

C. obovata, Colladon, Fl Br Ind, II, 264; Wight, Ic, t 575Syn — *CASSIA SENNA LINN, ? SENNA OBTUSA, Roxb*

Known in India as COUNTRY SENNA, and as ITALIAN, TRIPOLI, and JAMAICA SENNA, from its being one of the first species made known to Europe, it was cultivated in Italy during the 16th century

Vern — *Bhu Tarwar, BOMB*

References — *Roxb Fl Ind (Fl C B C) 352 W and A Prod 288 Mooden Sheriff Supp Pharm Ind, 94 in part Flück and Hanb, Pharmacog 218, Bentley and Trim, Med Pl 189 U S Dispens 1296 Ainslie Mat Med II, 249, Treasury of Botany Dymock Mat Med W Ind, 263*

Habitat — The Western Peninsula, Mysore and South India, especially the Coromandel coast. A small shrub, with the leaves smaller (leaf

C. 778

Negro Coffee.

CASSIA
occidentalis.

lets 3-6 pairs) than in *C. Burmanni*, and the pods not near so prominently tubercled over the seeds as in that species.

The writer is by no means certain that he is correct in regarding the

MEDICINE
Leaves

779

drian Senna being used as an adulteration in the commercial article. This habit has now for some time been discontinued, as also the cultivation of the plant (Conf. with *C. Burmanni*.)

Cassia occidentalis, Linn., *Fl Br Ind*, II, 262

THE NEGRO COFFEE

Vern — *Kasóndi* *bari kasóndi* or *kasunda* HIND and DUK, *Hikal*, BOMB, *Kasamara* SANS *Kalkashunda*, BENG, *Nattam takarai*,

780

Habitat — A diffuse, sub-glabrous under shrub, scattered from the Himalaya to the Western Peninsula, Bengal, South India, and Burma to Ceylon. Probably introduced. Distribution cosmopolitan in the tropics.

Medicine — The LEAVES, ROOTS, and SEEDS are used medicinally, and by Hindu and Muhammadan writers they are supposed to have the same properties as *C. Sennæ*. The

MEDICINE
Leaves

781

Root

782

Seed

783

sion of

In the

are emp

the form

the root

various parts. Some action is said to destroy the purgative principle in the seeds and make them taste like coffee. The whole plant is purgative. Dose of the leaves about 90 grains" (*Dr. Dymock Mat Med W Ind*)

"In the West Indies the root is considered diuretic, and the leaves, taken internally and applied externally, are given in cases of itch and other cutaneous diseases, both to men and animals. The negroes apply

a plaster. The root is of the stomach, and in

has analysed the seeds

CHEMISTRY

CASSIA
occidentalis

Negro Coffee

MEDICINE.

previously treated with ether, by means of alcohol of 60 per cent, the alcohol is distilled off, the syrupy residue treated with absolute alcohol,

of various bodies) It is soluble also in weak alcohol, and in acids and alkalis. The colour cannot be fixed upon tissues by any known mordant. This circumstance induced the author to term it *achrosine*, or 'not colouring,' although being coloured itself.

Special Opinions.—§ "Leaves pounded and made into a paste are applied to fresh wounds to bring on their healing by first intention" (Assistant Surgeon Anund Chunder Mukarji, Noakhali). "The mature" "Surgeon J. H. the treatment

FOOD
Seeds
784
NEGRO
COFFEE

the early part of the year a sample of an article imported at the port of Liverpool from Bathurst, River Gambia, under the above name. They were identified at Kew as the seeds of *Cassia occidentalis*. According to Livingstone, these are used under the name of '*Fedegoso* seeds' on the Zambesi as a substitute for coffee. Monteiro, however, states in his '*Angola and the River Congo*' (Vol II, p. 249) that *Fedegosa* seeds are used only medicinally as a substitute for quinine. The seeds are roasted and ground, and their infusion taken either alone or generally mixed with coffee" (1877, p. 39).

"These seeds occasionally find their way into the European market. The following extract from a letter from Dr. Nichols of Dombeira dated

native plant as coffee, but it is only lately that I have enquired into the

for our good coffee. Afterwards some of the seeds roasted and ground were brought to me, and the aroma was equal to that of the coffee ordinarily used in the island.

"I intend to send you a good quantity of the '*café marron*' in its stages of preparation, in order that you may have an opportunity of undergoing my experience, and afterwards, you will I think be willing to raise *Cassia occidentalis* above the rank of a weed. I may inform you that the plant itself is used by the native 'doctors' medicinally in the

C. 784

Kasondi Senna

CASSIA
Sophora.

form of a de-
I will enquir
report the ri
to the sugar
in large quantities" (1881, pp 34-35)

FOOD

Cassia Oil. See *Cinnamomum zeylanicum*.

C. siamea, Lamk, *Fl Br Ind*, II, 264

785

Syn — *C FLORIDA*, Vahl, *SENNA SUMATRANA*, Roxb

Vern — *Kassod*, BOMB, *Beati manje konne*, TAM, *Sime tangadi*, KAN,
Waa, SING, *Maisalee*, BLRM

Re — — — — —

Habitat — A moderate-sized tree, with smooth bark, found in South India, Burma, and Ceylon. Distributed to the Malayan Peninsula and Siam

Structure of the Wood — Sapwood whitish, rather large. Heartwood

TIMBER
786

C. Sophora, Linn, *Fl Br Ind*, II, 262

787

Syn — *SENNA SOPHERA* and *S ESCULENTA*, Roxb; *C CHINENSIS*, Jacq,
SENNA PURPUREA, Roxb

Vern — *Banar kasunda*, *bas ki kasondi*, HIND, *Kal kasundd*, BENG,
Saru-kasondi, *jangli takla*, DUK, *Kuwedice*, GUJ, *Ran tankala*,
MAR, *Ponná-tirai periya takarai*, *pirá-tirai*, TAM, *Taidi tangédu*,
nuti kashindha, *kasa mardhakamu*, *tagara chettu*, TEL, *Ponnam-*
takara, MALA, *Kasamarda*, SAHS, *Oru lora*, SINGH.

References — — — — —

95, *Dals*

Supp Pha

Mat Med

Raw Proa

Pl 343

Balfour, Cyclop

Habitat — A closely allied species to *C occidentalis*, from which it

is said to Ceylon and Penang

Medicine — The BARK, LEAVES, and SEEDS are used as a cathartic, and the JUICE of the leaves is viewed as a specific in ring worm, specially when made into a plaster in combination with sandal-wood. A paste made from the root is sometimes used instead of the juice of the leaves. The powdered seed is used for the same purpose and also for itch. The Sanskrit name means "destroyer of cough," it is supposed by Hindus to have expectoran for snake-b in the forr given in a and leave
Top of Dalm,

MEDICINE

Bark

788

Leaves

789

Seeds

790

Juice

791

C. 791

CASSIA
Tora.

The Fœtid Cassia

CHEMISTRY

Chemical Composition—"This plant, like several others of the same genus, owes its medicinal activity to the presence of chrysophanic acid, sometimes called Rhein, form $C_{14}H_6O_5$ (OH)₂. This substance belongs to the anthracene group of carbon compounds, and, like alizarin, is regarded as dioxyan thraquinone, $C_{14}H_6O_5 \left\{ \begin{smallmatrix} OH \\ OH \end{smallmatrix} \right\}$. It crystallizes in six sided prisms, is tasteless, and may be sublimed without decomposition, it is contained in Goa powder (50 per cent) rhubarb, most varieties of dock, *Lichen orcella*, *Permelia parietina*, *Cassia alata*, *C. occidentalis*, *C. Tora*,

and Vaseline, dissolve readily containing 52 per cent the fixed oils, a considerable amounts direct from Araroba ice, yielding the acid after re

FOOD
Leaves

792

793

TIMBER

794

Is this a new species?

Food—The leaves are eaten by men and animals" (Atkinson)
The disagreeable smell is removed by boiling

Cassia, sp (?)

Major Ford sent from the Andaman Islands, in 1866, a sample of a hard, durable wood, olive brown, with a structure very similar to that of *Ougeinia dalbergioides*. Evidently some common Andaman wood, and known by the name of *Gnugyi* (Gamble, *Man Timb*)

795

C. timoriensis, DC, Fl Br Ind, II, 265

Vern—*Arremene*, SING, *Young malsalee*, BURM

References—*Kurz, For Fl Burm*, 393, *Gamble, Man Timb*, 138, *Thwaites, En Ceylon Pl*, 96

Habitat—A handsome, small, evergreen tree, met with in Burma and Ceylon

TIMBER

796

Structure of the Wood—Dark brown, nearly black, resembling that of *C. siamea*, used in Ceylon for building and furniture

797

C. Tora, Linn, Fl Br Ind, II, 263**THE FÆTID CASSIA**

Vern—*Chakunda panwar*, HIND and BENG *Chak oda arak*, SANTAL *Pawar, panwar, pawas, chakunda*, PU, *Panwar*, N W P, *Takild*

C. 797

The Fœtid Cassia

CASSIA
Tora.

tarota takla, tankli MAR Kanaris, korariya, Guj, Tankala, koraria,

Re

and sons of Beng, 124 141 LISBON, U 11 of BOMU, 153, 140, 143,
201; Balfour, Cycop, Wardle, Report on Dyes & Tans of India

Habitat —A gregarious annual under shrub, from 1 to 2 feet in height, found everywhere in Bengal, and widely spread and abundant throughout the tropical parts of India

Dye —Baden Powell, Atkinson, and other writers say that the seeds

DYE
Seeds
798

a species of *Rhamnus*,
The use of Cassia seeds
1 chemical examination.

Mr. Wardle, while examining the dyes of India, had occasion to try the seeds of this plant, and found that they afforded a most useful yellow dye suitable for tasar silk. Mr. Wardle does not appear to have investigated the question of their special property, if any, of being used along with indigo, but from his results it is natural to infer that they would produce a green shade with indigo instead of assisting the blue

CASSYTHA
filiformis.

The Foetid Cassia; Akaswel.

MEDICINE
Leaves.
799
Seeds.
800

Medicinal.—The roots are used as an emetic both natives and

Root
801

rubbed on a stone with lime-juice, the *Vytians* suppose to be one of the

leaves of a Cassia shrub common in
in dhole's net" (*Deputy Surgeon-*

FOOD
Seeds.
802
Coffee
substitute.
803
Leaves.
804

pot-herb, both leaves and fruit (*Campbell*).

§ "The seeds are said to yield a decoction which is reported to be in every respect as good as coffee" (*Mr. C. D. Hardinge, Rangoon*) "A kind of coffee is made from this in Atracan" (*Prof. Romanis, Rangoon*).

Cassia, see *Ribes nigrum*.

CASSYTHA, *Linn* ; *Gen. Pl.*, III, 164.

805

Cassythia filiformis, *Linn* ; *Fl. Br. Ind.*, V, 188 ; *Wight, Ic.*, t. 1847 ;

LAURINER

Sweet or Spanish Chestnut

CASTANEA
vulgaris.

which
India
r parts
Arabia,

MEDICINE.
Plant.
806

natives in a vapour bath for
being placed under the bed"
Pindi, Panjab) "Sanskrit
and regard it as possessing

the property of increasing the secretion of semen" (U C Dutt, Civil
Medical Officer, Serampore)

Domestic—"A portion of the plant is by the Santal tied round the
neck, arm, and ankles, as a cure for ticks" (Rev A Campbell, Report,
Chuttia Nagpur)

DOMESTIC.
Charms.
807

CASTANEA, Garth, Gen Pl, III, 409

808

Castanea vulgaris, Lam, DC Prodr, xvi, 2, 114, 683, Cupuli- [FERE

THE SWEET CHESTNUT OF SPANISH CHESTNUT, CHÂTAIGNIER,
Fr, EDELKASTANIE, Germ

Syn.—C VESCA, Garth

References —Brandis, For Fl, 491, Gamble, Man Timb, 379, DC, Ori
gin of Cult Pl, 353, Smith, Dic, 110

Habitat—"A large, long-lived, deciduous tree, of rapid growth, more
rapid than the oak, introduced in the Himálaya, and grown in various
localities, and especially in a large number of places in the Panjáb and
the hills of the North-West Provinces, in Darphing, and the Khásia
Hills" (Gamble)

Cultivation—"It has been sown or planted in several parts of the

CULTIVATION
809

state of the species" (DeCandolle, Orig Cult Pl)

Food—The nuts are eaten When ground into meal they form an
important article of food for the poor Mr Atkinson says the tree was
introduced by Sir John Strachey in Kumáon, and in Dehra by Dr.

FOOD.
810

TIMBER.
811

CASTANOPSIS
tribuloides.

Probable New Tanning Material for India.

vigorously, along the Voages it is grown for vineyard poles, in Kent and Sussex for hop poles" (Brandis)

CASTANOPSIS, Spach, Gen Pl, III, 409

812

Castanopsis indica, Alph DC, Prodr, XVI, 2, 109, CUPULIFERÆ

References — Brandis, For Fl, 499, Gamble, Man Timb, 388, Kurz, For. Fl, Burm, 478, Balfour, Cyclop

FOOD.

813

TIMBER

814

both in

largely
oilarded

and the branches burnt for manure.

815

C. rufescens, Hook f. & Th, Gamble, Man Timb, 389

Vern — *Dalnê katás*, NEPAL, Sikkim, LURCHA, Hingori, Ass

Habitat. — A very large evergreen tree of Sikkim Himalaya, from

FOOD.

816

TIMBER.

817

818

C. tribuloides, Alph DC, Prodr, XVI, 2, III, Wight, Ic, 1 770

BURM

References. — Gamble, Man. Timb, 389; Brandis, For Fl, 499; Balfour, Cyclop

FOOD

819

TIMBER

820

Structure of the Wood — Grey, moderately hard. Annual rings marked by darker lines Used for planking and shingles, being good and durable.

C. 820

The Bay Chestnut The Ule Tree

CASTILLOA
elastica.

The tree coppices admirably and with *Castanopsis indica*, *Quercus spicata*, and *Engelhardia* might be grown on the hills wherever firewood and charcoal forests are required

CASTANOSPERMUM, *A Cunn*, *Gen Pl*, I, 556

"A genus of plants so named in consequence of the supposed resemblance of the seeds to the sweet chestnuts of Europe

Castanospermum australe, *A Cunn*, LEGUMINOSÆ

821

THE MORETON BAY CHESTNUT

References—*Drury*, U Pl 124 *Balfour*, Cyclop, *Smith*, Dic, 110
Treasury of Botany

FOOD.
822
TIMBER
823

CASTILLOA, *Cerv*, *Gen Pl*, III, 372Castilloa elastica, *Cerv*, URTICACEÆ

824

THE ULE TREE

References.—*Brandis*, For Fl, 427, *Kurz* For Fl, *Burm*, II, 419
Smith Dic, 87 89 *Spon's Encyclop*, 1659-61 *Reports of Bot Gar*
dens Nilgiri Hills, for 1881-82, 1882-83, and 1885-86

Habitat—A lofty forest tree of the Bread fruit family, native of America, lately introduced into Ceylon and some parts of India. In *Kew Report for 1877*, p 15, is given an account of the attempts made to introduce this plant into India. Burma, Assam, Ceylon and the lower slopes of the Nilgiris have now been pronounced as suitable for its cultivation.

Mr Lawson reports of the Nilgiri plants "In these days of uncertain coffee crops and low prices, planters are anxious to cultivate any plant

because we have not yet learnt how to tap the trees properly "

Gum—The tree exudes, on tapping, a milky juice which, when thickened, forms what is called the Central American rubber. In some coun-

GUM
825

of the ju ce of *Ipomœa bona-nox*

For further particulars of this gum see under "India rubber "

Castor Oil, see *Ricinus communis*, *Linn*, EUPHORBIAEÆ

C. 825

CASTANOPSIS
tribuloides

Probable New Tanning Material for India

vigorously, along the Vosges it is grown for vineyard poles, in Kent and Sussex for hop poles" (*Brandis*)

CASTANOPSIS, *Spach*, *Gen Pl*, III, 409

Several species of this genus are met with on the mountains of Eastern India, but none are reported to be used for tanning. This is probably an oversight, since the European members possess this property to a considerable extent, *Castanea vesca* containing 14 to 20 per cent of tannic acid

- 812 *Castanopsis indica*, *Alph DC, Prodr, XVI, 2, 109, CUPULIFERÆ*
Syn — *CASTANEA INOICA* Roxb, *Fl Ind Ed C B C, 674 Kurz, 11, 478*

V. Cha
kha,

References — *Brandis For Fl, 490, Gamble, Man Timb, 388 Kurz For Fl, Burm, 478; Balfour Cyclop*

FOOD
813
TIMBER
814

and the branches burnt for manure

- 815 *C. rufescens*, *Hook f & Th, Gamble, Man Timb, 389*
Vern — *Dalné katas* NEPAL, *Sirikishu* LEPCHA, *Hingori*, ASS
Habitat — A very large evergreen tree of Sikkim Himalaya, from

FOOD,
816
TIMBER
817

- 818 *C. tribuloides*, *Alph DC, Prodr, XVI, 2, III, Wight, Ic, t 770*
Syn — *CASTANEA TRIBULOIDES*, *Kurz (11, 480), QUERCUS FEROX* and *Q ARMATA*, *Roxb, Fl Ind, Ed C B C, 673*

Vern — *Támari katony* KUMAON *Musré katas kotur, chiss maku, zhangals* NEPAL, *Bar hingori, kanta singar*, ASS *Dingsaot*, KHASIA, *Singhara*, TIPPERAH, *Kanta tal batana*, CHITTAGONG, *Kyantsa*, BURM

References — *Gamble, Man Timb, 389, Brandis For Fl, 490; Balfour, Cyclop*

FOOD
819
TIMBER
820

Structure of the Wood — Grey, moderately hard Annual rings marked by darker lines Used for planking and shingles being good and durable

C 820

The Bay Chestnut. The Ule Tree.

CASTILLOA
elastica.

The tree coppices admirably, and with *Castanopsis indica*, *Quercus spicata*, and *Engelhardtia* might be grown on the hills wherever firewood and charcoal forests are required

CASTANOSPERMUM, *A. Cunn* ; *Gen Pl*, I, 556

"A genus of plants so named in consequence of the supposed resemblance of the seeds to the sweet chestnuts of Europe"

Castanospermum australe, *A. Cunn* ; LEGUMINOSÆ

821

THE MORETON BAY CHESTNUT

References — *Drury, U Pl*, 124, *Balfour, Cyclop*, *Smith, Dic*, 110, *Treasury of Botany*

Habitat — A tree of the sub-tropical regions of Australia, occasionally planted for ornament, introduced into India about thirty years ago

Food — The seeds are eaten by the natives of Australia, but are unpalatable to Europeans (*Smith*)

Structure of the Wood — White, with a yellowish tinge, hard

FOOD.
822
TIMBER
823

CASTILLOA, *Cerv*, *Gen Pl*, III, 372Castilloa elastica, *Cerv*, URTICACÆ

824

THE ULE TREE

References. — *Brandis, For Fl*, 437 *Kurz, For Fl, Burm*, II, 419 *Smith, Dic*, 87, 89 *Spon's Encyclop*, 1659-61 *Reports of Bot Gardens, Nilgiri Hills*, for 1881-82, 1882-83, and 1885-86

Habitat — A lofty forest tree of the Bread fruit family, native of America, lately introduced into Ceylon and some parts of India. In *New Report for 1877*, p 15, is given an account of the attempts made to introduce this plant into India. Burma, Assam, Ceylon, and the lower slopes of the Nilgiris have now been pronounced as suitable for its cultivation

Mr Lawson reports of the Nilgiris — coffee crops and low price that will return a small profit localities in the Wynnad suit the Castilloa, and vator" Colonel Camp Calcut "It has been

hope they this place either from because we

Gum —

GUM
825

For further particulars of this gum see under "India rubber"

Castor Oil, see *Ricinus communis*, *Linn*, EUPHORBIAECÆ

C. 825

Cedrelas or Toon woods

CEDRELA.

though faint, but the dye-stuff contains too small an amount of colouring matter to be of any great value in the dye house' Lisboa says that it is used in Bombay as a mordant

Medicine — The bark is slightly astringent, and is employed in infusion as a tonic, according to Dr Gibson it is an excellent and at the same time a readily available astringent, useful in the treatment of chronic

e, very hard,
cut, weighs
piece well, and
tremely quick
important trees
wood is used

for fires, as it burns readily, and the ashes retain the heat for a long time It is much valued for steam engines, ovens, &c" (*Treasury of Botany*) Clubs made of the hard wood are used in Fiji for beating the bark of the *PAPER MULBERRY* (*Broussonetia papyrifera*, Vent) for the manufacture of Tapa cloth (*Kew Official Guide to Museums*, 121) The natives of Australia make their war-clubs from this wood (*Smith*)

Domestic Uses — "The burnt ash is made into soap" (*Smith*)

DYE

MEDICINE.
830TIMBER
831DOMESTIC
Ash
832

Catechu, see—

[A 139] (a) *Acacia Catechu*, Willd, LEGUMINOSÆ (black catechu)

(b) *Uncaria Gambier*, Roxb, RUBIACEÆ (pale catechu)

[A 1298] (c) *Areca Catechu*, Linn, PALMÆ (palm catechu)

Cattle and Buffaloes see Oxen

Cat, Civet, see Tigers and Panthers.

Catha. Several species exist in India, but by the *Flora of British India* they have been all reduced to *Celastrus*, which see

Catha edulis yields the *Kat* or *Kafter* of the Arabs, the leaves of which if chewed are said to prevent sleep Sometimes imported into India, largely so to Aden, where they are used as a substitute for Tea.

Cat's-eyes, see Chalcedony.

Cat's-skins, see Skins.

Cauliflower and Brocoli, see *Brassica (oleracea) botrytis*, B 851

Caustic Potash, see Potassium, also Carbonate of Potash, C. 527.

Caustic Soda, see Sodium, also Carbonate of Soda.

CEDRELA, Linn, Gen Pl, I, 339

834

reco
to d
the
C . .

pan
branches, from which when in flower a panicle three or four feet long is suspended This is the characteristic form of the North-Western *Himálaya* at altitudes from 4,000 to 8,000 feet It frequents damp shady streamlets, growing so gregariously as to exclude all other trees

C. 834

CEDRELA
serrata.

The Toon woods.

In the Monograph of the Meliaceæ published in 1878 by Oasimir de Candolle, the species of *Cedrela* formerly grouped under the one head of *Cedrela Toona*, *Roxb*, have been separately described.

They are thus distinguished —

Ovary glabrous—

Leaflets petioled

C. serrata, *Royle*

Leaflets subsessile

C. glabra, *C de Cand*

Ovary hairy—

Leaflets acute at the base

C. Toona, *Roxb*

Leaflets round at the base

C. microcarpa, *C de Cand*

Mr Gamble, in his *Manual of Timbers*, XII, remarks that in his "*Trees, Shrubs, and Climbers of the Darjiling District*, three varieties were spoken of and separated as follows —

ber-December, bark light-
es, found in the upper hills

"No 1 is *C. Toona*, *Roxb*. No 2 probably *C. microcarpa*, *C de Cand*, No 3 probably *C. glabra*, *C de Cand*. It would, however, have probably been better to describe No 1 as 'deciduous in the cold season,' and Nos 2 and 3 as 'deciduous in the rains' There is perhaps a fifth species

"They may also be distinguished as follows by the capsule —

Capsule smooth { capsule round

C. Toona.

{ long, pointed

C. microcarpa

Capsule covered with corky tubercles

C. glabra.

"Of the Northern Bengal specimens which we have examined, E 360 and E 2333 will be *C. glabra*, while E 655, E 2332, E 3509, E 3619 and E 3623 will be *C. microcarpa*. Some of the Assam, Chittagong, and

000 feet, is probably *C. multijuga*,
RM, Nee, KAREN (Trade name,

It has a light, soft, pink wood,
with the usual characteristic scent strongly perceptible, and structure resembling that of the other species of Toon, the pores being perhaps

cepted as indicating
microcarpa, *DC*, as

835

Cedrela serrata, *Royle*, III, p 144, t 25; *Monog*, *DC*, I, 742,

[*MELIACEÆ*

Syn — *C. Toona*, *Roxb* (*Hook*, *Fl Ind*, 1, 558 in part)

Vern — *Drawi*, *dalli*, *dal*, *dauri*, *khishing*, *khinam*, N.W. H

TIMBER
836

large pores.

C. 836

The Toon woods.

Domestic Uses—Used about Simla, for the hoops for sieves for bridges, and for many such purposes. The shoots and leaves are lopped for cattle fodder.

Cedrela Toona, *Roxb., Fl. Br. Ind., l., 568, Wight, Ic., t. 161.*

THE TOON OF INDIAN MAHOGANY TREE, MOULMEIN CEDAR.

$$V_{\text{eff}} = \frac{\gamma}{2} \left(1 - \frac{1}{2} \right) = \frac{\gamma}{4}$$

CEDRELA
Toona

DOMESTIC
837
FODDER.
838

BURN

References — *Roxb, Fl Ind, Ed C B C, 213 633, Brandis For Fl,*

and Australia

Gum—It yields a resinous gum, of which little is known at present

M. Nees von Essenbeck has published an account of some experiments with the bark, which indicate the presence in it of a resinous

GUM.
839

DYE
Flowers
840
Seeds.
841

"It was a commoner practice under native rulers than it appears to be now to wear *bisanti*-coloured clothes in the spring, whence its name *bisanti*' or spring time. Safflower and tón are combined in *Turwa*. Dr. McCann

C. 84I

The Toon woods

They are thus distinguished —

Leaflets petioled

Leaflets pictured

Leaflets subsessile

C serrata, Royle

C glabra, *C. de Cand*

Ovary hairy—

Leaflets acute at the base

Leaflets round at the base

С Тоопа Рохб

C. microcarpa, *C. de Cand*

Mr Gamble, in his *Manual of Timbers XII*, remarks that in his "*Trees, Shrubs, and Climbers of the Daryling District*, three varieties were spoken-of and separated as follows —

[illegible]

N

ber December, bark light
es, found in the upper hills

"No. 1 is *C. Toona*, *Roxb.*, No. 2 probably *C. microcarpa*, *C. de Cand.*, No. 3 probably *C. glabra*, *C. de Cand.* It would however, have probably been better to describe No. 1 as 'deciduous in the cold season,' and Nos. 2 and 3 as 'deciduous in the rains'. There is perhaps a fifth species.

"They may also be distinguished as follows by the capsule —

Capsule smooth { capsule round

C. TORRE.

long pointed

C microcarpa

Capsule covered with corky tubercles

C *glabra*

"Of the Northern Bengal specimens which we have examined, E 360 and E 733 will be *C. glabra*, while E 655 E 2332, E 3599 E 3619 and E 3623 will be *C. microcarpa*. Some of the Assam, Chittagong, and Burma specimens are probably *C. microcarpa*.

"No B 3378 from the Salween, 2,000 feet, is probably *C. multijuga*, Kuntze, s. 229—Vern *Toungdama*, BURM., *Nee*, HAREN (Trade name, like the other Toon woods, *Thitkittado*). It has a light, soft, pink wood, with the usual characteristic scent strongly perceptible, and structure resembling that of the other species of Toon, the pores being perhaps more scantily distributed. Weight 35 lbs per cub c foot."

The preceding remarks may for the present be accepted as indicating the Nepal plant, *C. glabra*, DC, and the Sikkim *C. microcarpa*, DC, as distinct from the following —

835

Cedrela serrata, Royle; Ill., p. 144, t. 25. Monog., DC., I, 742.

[MELLACEÆ

SYN —C TOONA, Korb (*Hook, Fl Ind.*, 1: 558, in part)

Vern — Drawl, dalli, dāt, douri, kkhishing, kkhinam, N W H

TIMBER
836

large pores.

C. 836

The Toon woods.

CEDRELA
Toona

Domestic Uses—Used about Simla, for the hoops for sieves for bridges, and for many such purposes. The shoots and leaves are lopped for cattle fodder.

DOMESTIC
837
FODDER
838

Cedrela Toona, Roxb, Fl Br Ind, I, 568, Wight, Ic, t 161

THE TOON OR INDIAN MAHOGANY TREE, MOULMEIN CEDAR.
Vern.—*Tun, tuni, lum maha nim, maha lumbo, tunka jhar, tuna, lud,*

BURM

References—Roxb, Fl Ind, Fd C B C, 213, 633, Brandis, For, Fl,

Lum v. Wight, 14, Burm Dyes and Tun, iv-16, 1, 25, 26, Burd wood, Bomb Prod, 325, Lisboa U Pl Bomb 46, 241, 256, Balfour, Cyclop Treasury of Bot Kew Cat, 29, Fleming's Med Pl and Drugs in As Socy Res, Vol XI, 163, Med Top, IX, 93

Habitat—A large tree, about 50 to 60 feet in height, growing in the tropical Himalaya from the Indus eastward, and throughout the hilly districts of Central and South India to Burma, ascending to 3,000 feet in the N-W Himalaya and in Sikkim (?) to 7,000 feet. Distributed to Java and Australia.

Gum—It yields a resinous gum, of which little is known at present.

M. Nees von Essenbeck has published an account of some experiments with the bark, which indicate the presence in it of a resinous astringent matter, a brown astringent gum and a gummy brown extractive matter, resembling *Ulmine* (Balfour).

Dye—The flowers yield a red and a yellow dye (in Bengal generally known as *Gulnari*) said to be used to a small extent only.

Madras dyes sent to Paris.

It is known as *basanti* in the north-west provinces. It is fleeting and apparently only used by the poorer classes. In Burma it is used in conjunction with safflower. Sir E. Buck, in his *Report on the Dye-stuffs*,

GUM.
839

DYE.
Flowers
840
Seeds.
841

of Cawnpore is produced.

It was a commoner to wear *basanti*-colour

or spring time. Safflower

Dr. McCann

C. 841

CEDRELA
Toona.

The Toon-woods: Moulmoin Cedar

DYE.

MEDICINE
Bark
842

says the cloth previously dyed yellow is changed into red by the *pán* eaten by Hindus.
colc
usel

Flowers
843

be
Dr.
an
extract of the bark in chronic infantile dysentery Blume attributes valuable antiperiodic virtues to it, and in this character it is favourably noticed by Dr J Kennedy (*Ann of Med*, 1796, Vol I, p 387) Dr Æ. Ross speaks of it as a reliable antiperiodic, and Dr J Newton as a good substitute for cinchona The dose of the dried bark is about an ounce daily in the form of infusion The powder of the bark was found by Dr Kennedy to be of great service as a local astringent application in various forms of ulceration According to Dr Dymock, the native physicians use the bark in combination with bonduc nuts as a tonic and antiperiodic, a fact also mentioned by Ainslie in his *Materia Indica* The FLOWERS are called *Gul-tan* in Bombay and considered emmenagogue "The bark was used in Java by Blume in epidemic fevers, diarrhœa, and other complaints Horsefield gave it in dysentery, but only in the last state, when inflammatory symptoms had disappeared" (*Balfour*)

FOOD
844
TIMBER
845

Food—The seeds are used to feed cattle The young shoots and leaves are lopped as cattle fodder.
Structure of the Wood—Brick-red, soft, shining, even but open grained, fragrant, seasons readily, does not split nor warp Annual rings distinctly marked by a belt of large and numerous pores
It is durable and is not eaten by white ants, is highly valued and universally used for furniture of all kinds, and is also employed for door-panels and carving From Burma it is exported under the name

Price

.

and is used in
ent cases It
or many other

purposes
C. 845

The Deodar or Himalayan Cedar.

CEDRUS
Deodara.CEDRUS, *Lond*, *Gen Pl*, III, 93Cedrus Deodara, *London*, *DC Prodr*, XVI, 2, 409

846

DEODAR HIMALAYAN CEDAR.

Syn.—PINUS DEODARA, *Roxb*, *Fl Ind*, Ed C B C, 677Vern.—*kīlan ka-phér*, *kīlan deodār*, HIND, *Deodār*, *geyar*, *kela*, *kelu*,*hindi*, *nashīr* PERSReferences—*Brandis*, *For Fl*, 516, *Gamble*, *Man Timb*, 400, *Stewart*,
*Pb Pl**Sheriff**296 D**Dispen**410, A**Dist*,*four*,*Irvine*, 48

Habitat—A very large and tall tree, found in the North-West Himalaya, between 4000 and 10000 feet, extending east to the Dauli river (a tributary of the Alaknanda below the Niti Pass), in the mountains of Afghanistan and in North Beluchistan

Gum—It yields a true oleo-resin, called *Kīlon-ka-tel*. The preparation of this oleo resin is thus described by Mr Baden Powell—

'First, an earthen *ghara*, or vessel with a wide mouth, and capable of containing about 4 seers, is sunk into the ground. Next, a large *ghara* of about 12 seers capacity is taken, and three small holes are drilled in its under side, it is then filled with scraps of the pine wood, and a seer or more of turpentine is poured over it.

GUM
847

be made to do over wood yields about 26 *chitaks* of tar and 4·3 *chitaks* of charcoal. To procure a seer of tar to charge the pot, and 2 maunds (Pb Prod, 410)

wood by destructive distillation, and resembles crude turpentine. It is used for anointing the inflated skins which are used for crossing rivers, and as a

CEDRUS
Deodara.

The Deodar or Himalayan Cedar.

MEDICINE
848

remedy for ulcers and eruptions, for mange in horses and sore feet in cattle" (*Gamble, 406*)

Medicine —The aromatic wood is employed medicinally as a carmi-

FOOD
849
TIMBER.
850

stomach could bear. Its use may be extended to other skin diseases with advantage. Dr Royle states that the leaves and small twigs of the *Deodara* are also brought down to the plains, as they are supposed to possess mild terebinthinate properties (*Plarm Ind*). In Kangra the wood is pounded with water on a stone, and the paste applied to the temples to relieve headache. Assistant Surgeon Sakharam Arjun describes the wood as a bitter stomachic, useful in fever, costiveness, piles, and pulmonary complaints.

Food —The young shoots and plants are eagerly browsed by goats, &c.

Structure of the Wood —Heartwood light-yellowish brown, scented, moderately hard. In each annual ring the outer belt of firmer and

the edge of certain annual rings are frequently found concentric strings of dark-coloured pores or intercellular ducts, which are prominent on a vertical section as dark lines, and in the vicinity of which the wood is sometimes more resinous.

In common with most species of the Order, the *Deodar* has well marked annual rings which, there is little, if any, reason to doubt, each repre-

warm
kes it
from
ly be

the practice to take only for use in any forests, the experiments made on trees in that or neighbouring localities. But the experience we have

The Oleum Nigrum.

CELASTRUS
paniculata

inner Himalaya, having usually the age of trees 6 feet in girth above 140 years.

2nd—Those in the intermediate ranges and valleys, having 6 feet in girth for an age of between 110 and 140 years,

3rd—Those in the outer ranges under the full influence of the monsoon, and having the age of trees 6 feet in girth usually below 110 years.

Decodar wood is extremely durable, being by far the most durable of the woods of the Himalayan confers. It is the chief timber of North-West India, and is used for all purposes of construction,—for railway sleepers, bridges, and even for furniture and shingles. (*Gamble.*)

CELASTRUS, Linn.; Gen Pl, I, 364.

The *Flora of British India* raised Wight and Arnott's sub-genera (1) EUCELASTRUS and (2) GYNOSPORIA to the rank of genera. This was at first followed by the authors of the *Genera Plantarum*, but subsequently (Vol. I, page 997) was corrected back to the original position. The former embraces some four species of unarmed climbers, and the latter fif-

Celastrus emarginata, Willd ; CELASTRINEÆ.

Syn.—GYMNOSPORIA EMARGINATA, Roth, in Fl. Br. Ind., T. 621, CELASTRUS EMARGINATA, W. and A., Prodr., 160; Roxb., Fl. Ind., Ed. C B C., 208, CATHEA EMARGINATA, G. Don.

C. oxyphylla, Wall.

Syn.—GYMNOSPORIA ACUMINATA, Hook. f.; Fl. Br. Ind., I., 619

C. paniculata, Willd., *Fl. Br. Ind.*, I., 617; Wight, *Ic.*, t. 158.

BLACK OIL; THE OLEUM NIGRUM PLANT.

SYD.—CELASTRUS ALNIFOLIA, Don.; C. DEPENDENS, Wall.; C. MULTIFLORA and NUTANS, Roxb

Vern.—*Mal kangki, mál kungí*, HIND., *Sankhū, sankhū* (leaves, *kotaj*).

100

References.—*Roxb., Fl. Ind. Ed. C.B.C.*, 209—Brandie for *Fl.* v.

References.—*Rarb*, *Fl Ind*, Ed C.B.C., 200—Brandie *For Fl* p.

CELASTRUS
paniculata

The Oleum Nigrum.

OIL 855	<p>Habitat.—A scandent shrub of the outer Himālaya, from the Jhelum to Assam, ascending to 4,000 feet, Eastern Bengal, Behar, South India, and Burma, in Ceylon it is common up to an elevation of 2,000 feet.</p> <p>Oil.—The seeds yield by expression a deep scarlet or yellow oil, used medicinally.</p> <p>time Its odor turns of a dar cation along large and small ad</p>
MEDICINE. OIL 856	<p>Green the best small blue 12 annas to for cattle</p> <p>They are given in rheumat obtained from the seeds by externally This oil, under forward by the late Dr. H. When administered in doses of from ten to fifteen drops twice daily, its action as a powerful stimulant is generally followed in a few hours by free diaphoresis not attended by exhaustion. It is specially efficacious in</p>
Seeds 857	<p>aphrodisiacal and stimulant, useful both as an external and internal</p>
Leaves 858	<p>yellow and of the consistence of oil. The black oil manufactured at Vizagapatam and Masulipatam is the best. It is a good diuretic, diaphoretic, and nerve stimulant. It is certainly the best remedy for beriberi. I have seen many cases which did not benefit for weeks or months under the use of other medicines, but began to improve at once when this oil was employed. The first good effect of this medicine is generally the increase in the quantity of urine, and with this the dropsical effusion</p>
C. 858	

The Oleum Nigrum

CELASTRUS
senegalensis.

patient except milk and bread—a restriction which is as injurious as un- MEDICINE.

Food for
Qualls.

patient is under this treatment he should eat meat roasted I have seen
two or three cases of *beri-beri* cured by this treatment, and have also

diet, while using it, should consist exclusively of wheaten cakes and flesh
of sheep" (*Honorary Surgeon P. Kinsley, Ganjam, Madras Presidency*)

"An oil extracted by heat is a specific in the treatment of *beri-beri* with
marked success

Is a stimulant and
diet should be of
and milk, and no

among the people of the Northern Circars, especially of those of the
malarious tracts" (*Surgeon-Major E. W. Levinge, Rajamundry, Godavery
District*). "Said to be useful as an aphrodisiac" (*Surgeon-Major D. R.
Thompson, Madras*).

Structure of the Wood.—Pinkish yellow, soft.

TIMBER.
859
860

Celastrus senegalensis, Lam.

Syn.—

621;

Vern.—

khar

babu

pedd.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 208.* *Brandis, For. Fl., 81.*
Kurz, Fl. Burm., I, 252; Beddome, Fl. Sylhet., LXVI; Dals. & Gids,
Bomb. Fl., 48, Gamble, Man 1156, 87.

Habitat.—A profusely-armed tall shrub, common in the northern dry
and intermediate zones of Central, South-Western, and North-Western
India, distributed to Afghanistan, Central Asia, and Australia. The
Flora of Brit. I. & C.

comprises
the leaves &
stems are r
narrower

the leaves smaller and

Medicine.—The bark, ground to a paste and applied to the head, with
mustard oil, is said to destroy *pediculi*.

MEDICINE.
Bark.
861

CELOSIA
argentea.

Celestite; Celosia

862

Celastrus spinosus, Royle.

Syn.—GYMNOSPORIA ROYLEANA, Wall, as in Fl Br Ind, I, 620

Vern.—Yaliddhar, HIND, Dsarai, TRANS INDUS, Kandu, kamla, kandiari, kander, lóp, patáki, lei li, phupari, badlo, kadewar, Pn, Kura, bagriwala darim, gwala darim, N-W P

References.—BOISS, Fl Orient, II, 11 Brandis, For Fl, 80, Gamble, Man Timb, 86, Baden Powell, Pb Prod, 582, Stewart, Pb Pl, 41.

Habitat.—A thorny, distorted bush, abundant on the outer North-Western Himalaya (Kumaon and Garwhal, altitude 1,000 to 4,500 feet) and distributed to the Concan and thence to Afghánistan, common on the

MEDICINE

Seed

863

TIMBER

864

to be

ained,

on as a

Baden

possible substitute for boxwood, for carving and engraving
Powell remarks that it is used in the Panjáb for walking-sticks,

865

Celery. See Apium graveolens, Linn, UMBELLIFERÆ

Bombay

866

CELESTITE; Mallet, Mineralogy, 141.

Celestite or Celestine is a natural mineral, found in rhombic or

Punjab

867

the Salt Range

CELOSIA, Linn, Gen Pl, III, 24.

For botanical characters of the genus see under AMARANTACEÆ (A. 914).

The name is derived from *kelos*, burnt, in reference to the colour of the flowers in the common garden species

868

Celosia argentea, Linn, Fl Br. Ind, IV, 714, AMARANTACEÆ

Vern.—Debboti, sufaid murga, sarwari, HIND; Sirgit arak, SANTAL, Sarwari, saráti, ghogiya, N-W P, Sarwari, saigra, chulchil, sil, sarpankha, Pn, Suet-murgá, BENG, Sarwari, ucha kukur SIND; Lepadi, GÜJ, Kudhu, kurd, BOMB, Kurdá kurada MAR, Gurugu, panche chettu, TEL; Kirri kanda, SING Several of these vernacular names imply white-cock's-comb

Re

MEDICINE

Seeds

869

Oil

870

FOOD

871

FODDER

872

Habitat.—An abundant weed of the fields in Central and Northern India (from Chutia Nagpur to the Panjáb), occasionally ascending to altitude 5,000 feet in the Himalaya, it is also met with in the warmer parts of Ceylon. It appears very commonly in the monsoon season

Medicine.—The SEEDS are officinal, being an efficacious remedy in diarrhoea. The Rev A Campbell says the Santals extract a medicinal oil from them.

Food.—The plant is used as a pot-herb in times of scarcity, and is eaten by cattle, especially buffaloes.

C. 872

Celosia ; Celsia.	CELSIA coromandeliana.
Celosia cristata , Linn , <i>Fl Br. Ind</i> , IV , 715 ; <i>Wight, Ic</i> , t. 730	873
Vern.— <i>Kokan</i> , <i>fila murghka</i> , <i>lāl-murghka</i> , HIND ; <i>Mawal</i> , <i>taj khoro</i> ,	
R	
<i>Spons. Encyclop</i> , 939.	
Habitat.—Cultivated as an ornamental plant in the plains, and on the Himalaya, Kashmir (5,000 feet). In <i>Spons' Encyclopædia</i> occurs the remark that this plant is "Common all over Bengal and Northern India generally."	
Fibre.—"It yields a strong flexible fibre, so highly esteemed that rope made of	FIBRE. 874
fact is has been makes	
<i>Spons' Encyclopædia</i> quoted above, no author, as far as the writer can	
considered astringent ; menstrual discharges.	MEDICINE. Flowers. 875 Seeds. 876
General Character	FOOD. 877

being eaten Besides, three of the vernacular names given by the Professor are not names for this plant *Sil* (and names derived from that word) are more correctly applied to *Amarantus paniculatus*, the seed of which is eaten, so that it seems probable Professor Church's account of *Celosia cristata* should be transferred to *Amarantus paniculatus*.

CELSIA, Linn. ; *Gen. Pl* , II , 929.

Celsia coromandeliana, Vahl. ; *Fl. Br. Ind* , IV , 251 ; *Wight, Ic* , t. 1406, SCROPHULARINEÆ.

878

Vern.—*Kukhi* (in *Fl. Br. Ind*)

References.

217 ; *Dals*

Hort Sub

Ind , 97 ;

Ind , 482 ;

Cyclop

Habitat.—An herb found throughout India, from the Panjāb to Pegu and Ceylon, ascending to 5,000 feet in altitude. It generally appears during the dry season as a weed, on garden or cultivated lands

Medicine.—The inspissated juice of the leaves has been prescribed in cases of acute and chronic dysentery. It acts as a sedative and astringent (*Pharm of Ind*)

MEDICINE.
Juice
879

Special Opinions.—"Juice of the whole plant, including the root, leaves, and stem, squeezed out by pounding it, is used in half chittack doses, morning and evening, in cases of syphilitic eruptions. The juice of

R

C.

CELOSIA
argentea

Celestite, Celosia

862

Celastrus spinosus, Royle

.

Habitat.—A thorny distorted bush abundant on the outer North-Western Himalaya (Kumaon and Garwal, altitude 1,000 to 4 500 feet)

MEDICINE

Seed

863

TIMBER

864

Structure of the Wood.—Lemon coloured hard and close grained, wood deserves attention as a and engraving Baden walking-sticks

865

Celery. See *Apium graveolens*, Linn, UMBELLIFERÆ

Bombay

866

CELESTITE, Mallet, Mineralogy, 141

Celestite or Celestine is a natural mineral found in rhombic or tabular crystals or in masses. It is a form of Strontium sulphate, which is used in the arts in the preparation of Strontium nitrate—a Salt employed in fireworks to give a red light. There are two localities in India where Celestite has been found—in Bombay and Sind, scattered over the surface of the Kirthar limestones, and in the Panjáb, on the tertiary red clays of the Salt Range

Punjab

867

CELOSIA, Linn, Gen Pl, III 24

For botanical characters of the genus see under *Amarantaceæ* (A 914)

The name is derived from *kelos* burnt, in reference to the colour of the flowers in the common garden species

868

Celosia argentea, Linn, Fl Br Ind, IV 714, AMARANTACEÆ

MEDICINE

Seeds

869

Oil

870

FOOD

871

FODDER

872

. the fields in Central and Northern
 Panjáb) occas onally ascending to
 it is also met with in the warmer
 parts of Ceylon. It appears very commonly in the monsoon season
 Medicine.—The seeds are officinal being an efficacious remedy in
 diarrhoea. The Rev A Campbell says the Santals extract a medicinal
 oil from them.

Food.—The plant is used as a pot herb in times of scarcity, and is eaten by cattle, especially buffaloes

C. 872

Celosia ; Celsia

CELSIA
coromandeliana

Celosia cristata, Linn , Fl Br. Ind , IV , 715 , Wight, Ic , t 730

873

Ve

References — Roxb Fl Ind, Ed C B C, 229, Dals & Gibs, Bomb
Fl, 215, Stewart Pb Pl, 182 Murray Drugs and Pl, Sind, 101,
Baden Powell Pb Pr 373, Balfour, Cyclop, Treasury of Botany,
Spons, Encyclop, 938

Habitat.—Cultivated as an ornamental plant in the plains, and on the
Himalaya, Kashmir (5000 feet) In Spons Encyclopadia occurs the
remark that this plant is 'Common all over Bengal and Northern India
generally'

Fibre — "It yields a strong flexible fibre, so highly esteemed that rope
made of it sells at five times the price of jute rope' Confirmation of this
fact is much required, and also samples of the plant from which the fibre
has been extracted It is known in Bengali as *Lal-murga*, but Roxburgh
makes no mention of the fibre, indeed, with the exception of the notice in
Spons Encyclopadia quoted above, no author, as far as the writer can
discover, alludes to the fibre

FIBRE
874

Medicine — The FLOWERS are officinal, being considered astringent
they are used in cases of diarrhoea and in excessive menstrual discharges
The SEEDS are viewed as demulcent

MEDICINE
Flowers
875
Seeds
876

Special Opinion — § 'Seeds demulcent and useful in painful micturi-
tion, cough and dysentery' (Dr U C Dutt, Serampore)

Food — Cultivated in gardens — both the red and the yellow forms — on
account of the stem which is eaten as a pot herb Professor Church
(in Food Grains of India) is apparently in error when he speaks of the
food properties of the seeds of this plant The writer can find no mention
of the plant being cultivated on account of its seeds nor indeed of these
being eaten Besides three of the vernacular names given by the Pro-
fessor are not names for this plant *Sil* (and names derived from that
word) are more correctly applied to *Amarantus paniculatus*, the seed of
which is eaten so that it seems probable Professor Church's account of
Celosia cristata should be transferred to *Amarantus paniculatus*

FOOD
877

CELSIA, Linn , Gen Pl , II , 929.

Celsia coromandeliana, Vahl , Fl Br Ind , IV , 251 , Wight, Ic ,
t 1406 SCROPHULARINEÆ

878

Vern — *Kukshima koksind* BENG , *Kutki*, MAR , *Kulahala* SANS

Cyclop

and
durcase
gent (Pharm of Ind)MEDICINE
Juice
879

Special Opinions — § "Juice of the whole plant, including the root,
leaves and stem, squeezed out by pounding it, is used in half chittack
doses, morning and evening, in cases of syphilitic eruptions The juice of

R

C. 879

CELTIS
caucasica.
The Honey-berry.
MEDICINE.

 Root
 880

"The root is used in dysentery and as a cholagogue" (*Brigade Surgeon*
J. H. Thornton, Mongkur).

CELTIS, *Tourn.*; *DC. Prodr.*, XVII., 168.

881

Celtis australis, *Linn.*, *DC. Prodr.*, xvii., 169, 170, 179; **URTICACEÆ.**

THE EUROPEAN NETTLE-TREE, THE HONEY-BERRY TREE.

Habitat.—A moderate-sized, deciduous tree, found in the Suliman and Salt Ranges, and throughout the Himálaya from the Indus to Bhután, ascending to 8,500 feet, also in the Khásia Hills. Extensively cultivated in South Europe.

FOOD.
Fruit.
 882
FODDER.
 883

Food and Fodder.—The tree is largely planted for fodder; cows fed on the leaves are supposed to give better milk. The **FRUIT** is also eaten. "It is remarkably sweet, and is supposed to have been the Lotus of the

which Herodotus, Dioscorides, and leasant, and wholesome, and which make those who ate it forget their If eaten in Spain, and Dr. Walsh very fond of them" (*Treasury of*

Botany) It is nowhere grown as a fruit tree in India, although, as Atkinson adds, it is eaten by all classes and is esteemed.

A dark-purple form of the fruit is called *rokū* and a smaller yellow form *choku*.

TIMBER.
 884

Structure of the Wood.—Grey or yellowish grey, with irregular streaks of darker colour. Weight 47½ per cubic foot. It is tough and

DOMESTIC.
 885

 king
 y of

886

C. caucasica, *Willd.*, *DC. Prodr.*, xvii., 170.

Vern.—*Balkar*, *brámj*, *brimás*, *brimín*, *bigín*, *biúgu*, *kharg*, *khark*, *khirk*, *karik*, *kharak*, *khalk*, *ku*, *takhum*, *tágho*, *wattamman*, *kanrak*, *kirk*, *kar*, *kargam*, *taghum*, *takpun*, *karg*, *kaughol mirch* (the fruit), *Pá.*, *Tughar*, *PUSHTU*.

C. 886

The Nettle-trees.

CELTIS
cinnamomea.

References.—Brandis, *For. Fl.*, 428, 429; Gamble, *Man. Timb.*, 341;
Stewart, *Pb. Pl.*, 209; Hutchison, *Cat. Pb. Pl.*, 139; Balen Fowell, *ib.*
Fr., 574; Balfour, *Cyclop.*

FIRRE.

887

MEDICINE.

FRUIT.

888

FOOD.

FRUIT.

889

TIMBER.

FRUIT.

890

DOMESTIC.

CHARM.

891

SANDALS.

892

893

Pl., 209)

Celtis cinnamomea, Lindl., Kurz, *For. Fl. Burm.*, II., 472.

Syn.—*C. DISODOXYLON*, Thw.

Vern.—*Gurunda*, SING.

References.—Gamble, *Man. Timb.*, 343, Thw., *En. Ceylon. Pl.*, 471.

stem

also

Vara.

Kya-ka (or *Hien* & *Intense*), is used as a charm against evil spirits. This was described by Dr. W. Dymock in the 1st edition of his *Maleria Medica of Western India* under its vernacular name. The writer's attention having been drawn to this, a correspondence was instituted. Dr.

MEDICINE.

WOOD.

894

name of *Celtis dysodoxylon*.

ing people as *pudacarpam*.

by the Dutch *strunthout*, as

its disgusting odour, which remains specially in the dark stem and the larger branches. The smell of it so perfectly resembles that of human ordure, that one cannot perceive the smallest difference between them.

other cutaneous eruptions, the body being at the same time anointed with it externally."

CELTIS
Wightii.

The Nettle-trees.

MEDICINE
Price
895

Dr. Dymock states: "The peculiar odour is probably due to the presence of *naphthylamine*. The price of the wood in Bombay is Rs 30 per

have been here recorded as a basis of further investigation, since the Indian trade in the wood is of some importance

896

Celtis eriocarpa, Dene, DC Prodr., XVII, 179.

Vern — *Akala, katia*, HIND, *Batkar, bat tamanku*, PB; *Tagha*, ASC
References — *Brandis, For Fl.*, 429, *Gamble, Man Timb*, 343; *Baden Powell, Pb Pr*, 574; *Balfour, Cyclop*

Habitat

Salt Rant
from the

DOMESTIC

Domestic Uses. — The bark is used for making shoes (*baun fustia*)

897

C. orientalis, Linn See *Sponia orientalis*, Planch

898

C. Roxburghii, Planch, Brandis, For Fl, 429.

Syn — *C. trinervia*, Roxb, Fl Ind, Ed C B C, 252

Vern — *Kharak, batkar, bráma, brándu*, PB; *Cher, chora, kathaniar*, C P, *Bommai*, BOMB.

References — *Bedd, Fl Syle.*, CCCXII, *Gamble, Man Timb*, 343; *Dale & Gils, Bomb Fl*, 273, *Lasbo, U Pl Bomb*, 131

TIMBER

899

900

C. tetrandra, Roxb, DC Prodr., XVII, 179

EUROPEAN MYRTLE TREE

Habitat. — A tall tree of the outer Himalaya, from Kumaon eastward, to the Ava Hills in Burma, also on the Western Ghats

TIMBER.

901

Structure of the Wood — Greyish white, moderately hard Used in Assam for plank and canoes.

C. trinervia, Roxb See *C. Roxburghii*, Planch.

902

C. Wightii, Planch, DC Prodr., XVII, 184; Wight, Ic, t. 1969

Syn — *SOLENOSTIGMA WIGHTII*, Bl, Kurz, For Fl Burm, II, 471

Vern — *Vella thorasay*, TAM, *Tella kaka-mushti*, TEL

References — *Gamble, Man Timb*, 343; *Thwaites, En Ceylon Pl*, 267, *Balfour, Cyclop*

Habitat. — A small evergreen tree of the mountains of South India and the Andaman Islands, is also met with in the hot dry parts of Ceylon

TIMBER.

903

Structure of the Wood — Greyish white, very hard, close-grained Weight 53 lb per cubic foot. Annual rings indistinctly marked by a narrow belt without pores (*Gamble*)

C. 903

Cements.

CEMENTS.

CEMENTS.

904

CEMENTS, *Fr.*; CEMENTE, *Ital.*; Gert.

The term "Cement" is applied to a class of substances used for uniting two bodies, and which ultimately harden and bind them together. The following classification of these substances from *Spon's Encyclopædia* may be here given: (a) Calcareous cements, (b) Gelatinous cements, (c) Glutinous cements, (d) Resinous cementing compounds, and (e) Non-resinous cementing compounds. Interesting information regarding the Cements of India will also be found in *Bulfour's Cyclopædia of India*.

Calcareous.
905

from 10 to 25 per cent of alumina, magnesia, and silica, yield a lime, on burning, which does not slake when moistened with water, but forms a mortar with it, which hardens in a few days when covered by water."

cements. (See Cocoa-nut juice under *Cocos nucifera*)

(b) GELATINOUS CEMENTS—These have their origin in the substance known as "gelatine" obtained by boiling animal tissues in water. It is separated from water by simple evaporation, when it is converted into a dry hard substance called by different names, such as "glue," "size," "isinglass," &c., according to the sources from which they are derived. Of these, "glue" and "size" are employed as cements, and in India a strong and useful glue, made from cartilage obtained from fish, is used by every jeweller and gold-leaf beater.

Gelatinous.
906

(c) GLUTINOUS CEMENTS—The base of this class of cements is a sub.

Glutinous
907

this class of substances are due to the presence of resin, gum-resin, or gum, such as common rosin, india-rubber, gutta-percha, gum arabic, &c. The following are a few of the Indian plants which are known to afford substances used as cements:—

Resinous.
908

Adenanthra pavonina (seeds).
Aegle Marmelos (glutinous and
tenacious matter).
Artocarpus hirsuta (juice).
A. integrifolia (juice).
Balsamodendron Roxburghii (gum-
resin)
Bauhinia retusa (gum).
Borassus flabelliformis (juice).

Crataeva religiosa (fruit).
Dichopsis elliptica (gum).
Euphorbia Cattumandoo (milky
juice)
E. Royleana (juice).
Ferona Elephantum (gum).
Tamarindus indica (seeds).
Typha angustifolia (down of the
ripe fruit).

C. 908

Celtis	The Nettle-trees
Wightii.	
MEDICINE Price 895	Dr. Dymock states "The peculiar odour is probably due to the presence of naphthylamine The price of the wood in Bombay is Rs 30 per candy of 7½ cwts The Portuguese call it <i>Pao de merda</i> and <i>Pao Sujo</i> " It has thus still to be proved that the <i>Narakya-ud</i> is derived from <i>Celtis cinnamomea</i> , but should this be found correct, it is probable India may get its supplies from Assam or Burma, or perhaps from the Malayan Peninsula instead of from Ceylon The various opinions given above have been here recorded as a basis of further investigation, since the Indian trade in the wood is of some importance
896	Celtis eriocarpa, DCne ; DC Prodr, XVII, 179 Vern— <i>Akata katdia</i> HIND, <i>Balkar bat tamanku</i> , PS, <i>Taghera</i> , AFG References—Brandis, <i>For Fl.</i> , 429 Gamble, <i>Man Timb.</i> , 343, Baden Powell, <i>Pb Pr.</i> , 574; Balfour, <i>Cyclop</i> Habitat.—A moderate sized, deciduous tree, found in the Suliman and Salt Ranges from 2 000 to 3 000 feet, and distributed along the Himalaya from the Indus to Nepal ascending to 4 500 feet Domestic Uses.—The bark is used for making shoes (<i>Baden Powell</i>)
DOMESTIC 897	C. orientalis, Linn See Sponia orientalis, Planch
898	C. Roxburghii, Planch, Brandis, For Fl., 429 Syn—C TRINERVIA, <i>Roxb Fl Ind, Ed CB C</i> , 262 Vern— <i>Kharak balkar brumaj, brandu</i> , PS, <i>Cheri chara, kathunidr</i> , C P, <i>Bowmaj</i> , BOMB References—Bedd <i>Fl Sylve, CCCXII</i> , Gamble <i>Man Timb.</i> , 343; Dale & Gids <i>Bomb Fl.</i> , 273, <i>Lusboa U Pl Bomb.</i> , 131 " " " common in the forests of South India in the Western Ghats
TIMBER 899	
900	C. tetrandra, Roxb DC Prodr, XVII, 179 EUROPEAN MYRTLE TREE
TIMBER. 901	Assam for planking and canoes
902	C trinervia, Roxb See C Roxburghii, Planch C. Wightii, Planch ; DC Prodr, XVII 184, Wight Ic, t 1969 Syn—SOLENOSTIGMA WIGHTII, Bl Kurz, <i>For Fl Burm.</i> , II, 471 Vern— <i>Vella thorasay</i> TAM, <i>Tella koka mushti</i> TEL References—Gamble <i>Man Timb.</i> , 343, Thwaites <i>En Ceylon Pl.</i> , 267 Balfour, <i>Cyclop</i> Habitat—Common in the forests of South India and
TIMBER 903	
C 903	

Cultivation of *Ipecacuanha*.CEPHAELIS
Ipecacuanha

sternutatory Boiled to a paste and applied to the cheeks, it is employed in the cure of tooth ache" (*Murray*).

Special Opinions.—§ "*Nak chinis*, sulphur, vinegar, and the leaves called *chitta*, mixed together, are used for pityriasis versicolor" (*Surgeon-Major C. W. Calthrop, Morar*). "It is used for hemicrania" (*Surgeon-Major F. Robb, Ahmedabad*).

CEPHAELIS, *Swartz.; Gen. Pl., II., 127.*

Cephaelis Ipecacuanha, *Ruh.; Fl. Br. Ind., III., 178; Bot Mag., [t. 4063; RUBIACEÆ*

IPECACUANHA ROOT, *Eng.;* RACINE D'IPÉCACUANHA ANNELÉE, *Fr.,* BRECHWURZEL, *Germ.*

Syn.—*C. ERETICA, Pers.; CALLICocca IPECACUANHA, Brot.; IPECACUANHA OFFICINALIS, Arruda*

References.—*Kurz, For. Fl. Burm., II., 5; Gamble, Man. Timb., 219; Pharm. Ind.,*

Ind., 543; t.

1873, 233,

Papers, 343

Ag. Hort. Soc., Vol. V., p. 47.

MEDICINE.

916

CULTIVATION.

creasing costliness of the drug, have occasioned active measures to be taken for attempting its cultivation in that country. Though known for several years as a denizen of botanical gardens, the *ipecacuanha* plant has always been rare, owing to its slow growth and the difficulty attending its propagation.

"With
culty has
The first
had been

standing every care, the plants could not be made to thrive. Three plants, which had been sent to the Rungbi plantation in 1868, grew rather better, and by adopting the method of root propagation, they were increased by August 1871 to 300. Three consignments of plants, numbering in all 370, were received from Scotland in 1871-72, besides a smaller number from the Royal Gardens, Kew. From these various

conditions as regards sun and shade, but thus far with only a moderate

Dr. King reported to the Director of the Royal Botanic Gardens, Kew, in 1877, that he had distributed plants from the Calcutta Botanic Garden to Ceylon, Singapore, Burma, and the Andaman Islands, and also stated

CENTIPEDA
orbicularis

White Behen

Resinous

Non-resinous
909

class are too numerous to be mentioned here. The reader is referred to the list given in *Spons' Encyclopadia*, pp 626-627

CENCHRUS, Linn, Gen Pl, III, 1105

Cenchrus catharticus, Del, Duthie, Fodder Grasses, 15, GRAMINEÆ

Syn.—C ECHINATUS Rich.

Vern — Bhurt, Hind, Dhaman, argana N W P, Basla, led laptā, bhast, Pē, Bhavbhunt, Jeyfore, Bharout, Ajmir, Kukar, BANDA

References — Stewart, Pb Pl, 252, Atchison Cat Pb Pl, 163, Murray, Pl and Drugs, Sind, 10, 13, Duthie, List of Grasses, N W P, 9

FODDER
910

ritious
(thie)
The

911

C. montanus, Nees.

This fodder grass is known as the *anjan* and *dhaman* in the Panjāb, and is considered by some one of the most nutritious of grasses and makes good hay

912

CENTAUREA, Linn, Gen Pl, II, 477

Centaurea Behen, Linn, COMPOSITE

THE WHITE BEHEN OR WHITE RHAPONTIC

Vern — Bahman, safaid, suffaid, bahman HIND, BOMB; Behen (or

Habitat — A native of the Euphrates Valley. The root is largely imported into India, reaching Bombay from the Persian Gulf. It is always to be found in native druggists' shops

CENTIPEDA, Lour, Gen Pl, II, 430

913

Centipeda orbicularis, Lour, Fl Br Ind, III, 317, Wight, Ic, [t 1610, COMPOSITE

Syn — ARTEMISIA STERNUTATORIA, Roxb Fl Ind Ed CBC 600

MEDICINE
Seeds

914

Leaves

915

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sea

Medicine — T

Hindus also the pē

India, but the dry

ed in the druggist

dered LEAVES are used in affections of the head, such as colds, &c, as

C. 915

Cultivation of Ipecacuanha.

CEPHAELIS
Ipecacuanha.

conditions as to soil, moisture, and shade We have not even now a CULTIVA-
TION.

tropical It may, therefore, be found necessary to afford the plants

however, fortunately not been realized, and the drug is now obtainable at pretty much the same price as twenty years ago

In *South India* cultivation seems more hopeful than in Sikkim The late Mr Melvor, in May 1870, planted a few Ipecacuanha plants in the Botanic Gardens at Barhyâr These succeeded fairly well, but in 1881 82, Mr Lawson, the present Superintendent of the Botanic Gardens, reported that he did not think the plant could be there grown as an article of commerce Later on, he seems to have attained more confidence in the pos-

been made above, that gentleman says of the South Indian experiments

could not produce the drug in any quantity at the usual market rate (from 4 to 5 shillings per pound), at which it can be bought in London

In an official communication dated May 1887 Dr Bidie writes hopefully

PROPAGA-
TION.

product. There are doubtless, however, many other similar regions where it might be grown The plant grows slowly, and has little in it to attract the attention of the cultivator, so that it may be doubted when private enterprise may be prepared to relieve the Government of its present

CEPHAELIS
Ipecacuanha

Cultivation of Ipecacuanha.

CULTIVA-
TION.

to prevent the culti-
opean planters The
s, besides, little calcu-
seedlings, and in 1870-71
Some of these were culti-
sent to Madras. Of the
the higher regions of the
Nights thus were not found to be suitable. About this stage the Bom-
bay Government became anxious that a consignment of plants should
cultivation at the Cinchona planta-
definite consignment of Messrs
Mr W. Walton of the Cotton De-
ase, under the care of that gentle-
which Dr King, in 1871, reported as
thy condition. These were sent to
eral
oth
ten-
the
writer has been permitted to peruse, it would appear that the process of
them "The recent success in propagating has been entirely due to the
discovery that this plant, unlike most others, can be propagated freely
the plant's growth, materials
y Propagation has all along
and at an elevation of about
have naturally been confined
nts, so as to get a sufficiently
large stock for experiment, with the view of determining the conditions
of plants have been put out at different elevations and under different
C. 916

Cultivation of Ipecacuanha.

CEPHAELIS
Ipecacuanha.

CULTIVA-
TION.

conditions as to soil, moisture, and shade. We have not even now a

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PROPAGA-
TION.

it might be grown There is no doubt that it can become an important commercial product. There are doubtless, however, many other similar regions where the attention of the enterprise may be | attract private present

CEPHAELIS
Ipecacuanha.
Medicinal properties of Ipecacuanha.
PROPAGA-
TION.

efforts. Dr. King, in his paper read before the Agri-Horticultural Society, indicates clearly the peculiarities and necessities of the plant, and in his more recent communication (the official papers referred to above) he reiterates more strongly the same opinions. "There can be no doubt that the occurrence of a distinctly marked cold season is disadvantageous to the growth of Ipecacuanha. I sent plants of it for trial to the Andaman Islands and Singapore, both being localities where there is no cold season. But at neither place has the cultivation been much of a success. I had an opportunity of seeing, in the Singapore Garden, during the year 1879, the Ipecacuanha plants which I had sent from Calcutta, a year or two previously. And contrary to my expectations, I found them growing very indifferently. The plants sent to the Andamans I have never seen, but I understand that they did not come to much."

Large numbers of plants have been freely distributed to private cultivators, but it may be concluded that it still remains to be demonstrated whether or not the medicinal properties are preserved in the Indian cultivated stock. These may improve as in the case of some of the Cinchonas, but on the other hand, they may decline, so that it must be concluded Ipecacuanha in India is even now but in its most early experimental stage.

MEDICINE.
Root.
917

The treatment of this disease by large doses of Ipecacuanha (grs. xxx to grs. lx), of late years re-introduced, has been found most effectual. In diarrhoea, and in some forms of dyspepsia, especially when connected with functional derangement or torpidity of the liver, it acts beneficially. As an expectorant it is in common use in catarrhs, chronic bronchitis, asthma, phthisis, the early stages of hooping-cough, &c. In hæmorrhages, especially in uterine hæmorrhages and in menorrhagia, it has proved an effectual remedy. For removing crude and indigestible matter from the stomach, Ipecacuanha acts with certainty and safety as an emetic, without inducing nearly the same amount of subsequent depression that follows tartar emetic, it is especially adapted for childhood and for persons of a delicate constitution. As a counter-irritant (2 drs. of powdered Ipecacuanha incorporated with 2 drs of olive oil and 4 drs. of lard, rubbed into the skin for a few minutes, once or twice daily), it has been advanced

CHEMISTRY.
918

The alkaloid, which, taken internally, is a potent emetic.

C. 918

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Medicinal properties of Ipecacuanha

CEPHAELIS
Ipecacuanha.

CHEMISTRY.

"Emetine, discovered in 1817 by Pelletier and Magendie, is a bitter substance with distinct alkaline reaction, amorphous in the free state as well as in most of its salts, we have succeeded in preparing a crystallized hydrochlorate

"The root yields of the alkaloid less than 1 per cent, the numerous higher estimates that have been given relate to impure emetine, or have

$20 \text{ H}^{50} \text{ N}^2 \text{ O}^5$,
found in 1877

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"If the wood, separated as exactly as possible from the bark is used
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Special Opinions — § "Applied locally to bites of venomous insects and scorpions" (Surgeon-Major C W Calthrop, Morar) "With out door patients suffering from dysentery unsuited and inconvenient used with much benefit

pill, and given every three hour, when for a malarious origin, quinine one grain to each pill was added" (Honorary Surgeon Peter Anderson, Madras Presidency) "In 3 gr doses it is a most efficient calmative and sedative in delirium tremens" (Surgeon-Major W. Farquhar, Ootacamund)

CEPHALOSTACHYUM
capitatum.

Coccinia Indica.

CEPHALANDRA, *Schrad.*; *Gen. Pl.*, I., 827.

919 *Cephalandra indica*, *Naud*; *Fl. Br. Ind.*, II., 621; *Wight*, III., I. 105; *CUCURBITACEÆ*.

bung, tsa-tha-khwa, BURM; *Kówa-ká*, SING

References.—*Ko* 128; *Dalz &*

Cat Ph Pl, I,

112, 113

1; *Lisboa*,

Habit

Medic

plant is

used by

metallic

preparations prescribed by them in diabetes." "The expressed juice is directed to be taken in doses of one *tola* along with a pill, every morning." (*U C Dutt, Mat Med Hind*). The root, according to *Moodeen Sheriff*, is sold as a subst

in the bazars of Southern India

and are useful as a colouring ager

the essential oil. "The root when

which hardens into a reddish gum on drying, and is very astringent, but

not bitter like the fruit" (*Dymock*) "The bark of the root, dried and

reduced to powder, is said to act as a good cathartic, in a dose of 30

grains" (*Medical Topography of Dacca*, 58). "The LEAVES, mixed with

ghí, are applied as a liniment to sores. The whole plant, bruised and

ered cummin seeds, is

son) "The leaves

he plant internally in

gonorrhoea" (*Balfour*) "In the Concan the green fruit is chewed to

cure sores on the tongue" (*Dymock*).

Food—"The oblong fruit, about 2 to 2½ inches long, green when

young, scarlet-red when ripe, fleshy, smooth, is eaten both raw and

cooked. The ripe fruit is sweet" (*Lisboa*). The fruit is one of the com-

monest of native vegetables (*Dymock*). It is eaten fresh when ripe and

cooked in curries when green (*Roxb*)

924 *Cephalocroton indicum*, *Beddome*, 261; *EUPHORBIACEÆ*.

A common tree in the moist forests of South India (altitude 1,500 to 4,000 feet); yields a timber useful for building purposes.

CEPHALOSTACHYUM, *Munro*; *Gen Pl*, III., 1213.

(See Vol. I., B 69, No. 9.)

925 *Cephalostachyum capitatum*, *Munro*; *GRAMINEÆ*.

VERN.—*Gobia*, गोपी, NEPAL, *Payong*, LEPCHA; *Sili*, *sullea*, KHASIA.

Reference—*Gamble, Man, Timb*, 429.

Habitat—Found in Sikkim and the Khasia Hills.

C. 925

Wax.	CERA alba.
Food.—This semi-scandent and often gregarious bamboo, on flower- the natives in times of	FOOD. Grain. 926
to 30 feet long, strong. with internodes about 2½ feet, thin, yellow, used for bows and arrows by the Lepchas. It flowered in Sikkim in 1874 (Gamble)	TIMBER. 927
Cephalostachyum latifolium, Munro	928
Reference.—Gamble, Man Timb, 419	
Habitat.—A species with large leaves, found in Bhutan.	
C. pallidum, Munro, Kurz, For Fl Burm, II, 563	929
Vern.—Beti, Ass.	
Reference.—Gamble Man Timb 419	
Habitat.—A bamboo with shrubby stems. It grows in the Mishmi Hills and in Ava	
C. pergracile, Munro, Brandis, For Fl, 567	930
Vern.—Tin-wa, kengwa Burm	
References.—Aurs, For Fl Burm, II, 564, Gamble, Man Timb, 419	
Habitat.—A bamboo common in upper mixed forests of Burma, often gregarious. It has stems often 40 to 50 feet long	
CERA.	
Cera alba and flava.	931
Ve.	
References.—Pharm Ind, 278, Moodeen Sheriff, Supp Pharm Ind, 97; Ainslie Mat Ind I, 479, Bidie Cat Aus Prod, Paris Exb, 64; Baden Powell, Pb Prod, 166; Fleming, Med Pl and Drugs, Asia tic Res, XI, 195	
Description.—The prepared Honeycomb. Occurs in masses, firm, breaking with a granular	
light. Occurs in circular not viscous to the touch. It does not melt under 130° F. (Pharm. Ind)	
Medicine.—Honey is emollient and slightly laxative, and is often	MEDICINE. 932
Ind.) For further information see Bees, also Wax	
Special Opinions.—§. The oil is used as a liniment and is of great value in muscular and chronic rheumatism (Surgeon Major A S G Jaya- kar, Muskat, Arabia)	
C. 932	

CERATONIA
Siliqua

The Carob Tree.

Ceramic Manufactures, *see* Earthen-ware
Cerasus cornuta, *Wall*, *see* Prunus Padus, *Linn.*

CERATONIA, *Linn*, *Gen Pl.*, I, 574

933

Ceratonía Siliqua, *Linn.*, *DC Prodr*, II, 486, LEGUMINOSÆ.
THE LOCUST TREE, THE CAROB TREE, ST JOHN'S BEAN, OR BREAD
OR LOCUST BEAN, ALGAROBIA of Spain, CARRUBIO, *It*,
CARUBA, *Ger*

Vern — *Kharnub*, *kharnúb nubts* (the pods), *Ps*; *Kharnub shámi* or
kharnub nubti, *ARAB*

References — *Roxb*, *Fl Ind*, Ed C B C, 361, *Brandis*, *For Fl*, 166;
Gamble Man Timb, 133 145, *Dals & Gids*, *Bomb Fl Suppl*, 28;
Cult 364;
nson,
omb,
asury
ndia,

Habitat — A slow-growing, evergreen tree, indigenous in Spain and

CULTIVA-
TION.

934

Cultivation of the Carob.

CERATONIA
Siliqua.

In the Panjáb, considerable quantities of seed have been sown from as early as 1844, in the districts of Panipat, Gurgaon, Rohtak, and Delhi,

CULTIVA-
TION.
935

(Stewart, Pb Pl. 63) Mr. Ricketts was of opinion that the seeds should be well soaked before planting, and the trees when planted out should not be too far from each other to ensure their fruiting.

In Madras, the experiments were made in various localities, but the general result was anything but satisfactory. The seeds did not germinate in some cases, and in others, the seedlings soon died off.

936

In Bombay and Sind—"During the last two years, District Forest Officers in the Bombay Presidency have been engaged in carrying out experiments with carob seed, but the results do not appear to have been very promising. In Sind the Conservator states that all the plants were protected by mats from the frost during the cold season, and adds that when once these plants have established themselves in the soil, they should be able to exist without artificial irrigation or protection; at present they are too small, and it would be premature to express an opinion as to their flourishing in Sind or not. The Superintendent of the Economic Garden at Haidarabad, Sind, also states that, though the plant will grow, the slowness of growth is very marked."

937

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tree in the 1 dolla gardens about 7 lb of fairly good fruit were obtained in May last year, and the crop would have been heavier if protected from

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les to them as

MEDICINE.
Pods.
939

Food.—The pods, full of sweet pulp, are a good article of food in the Mediterranean and are exported into the Panjáb and other parts of India. They form an important constituent of the "husks" sold by John the Baptist.

FOOD.
Pods.
940

CERBERA
Odollam

The Carob Tree.

In the *Treasury of Botany* occurs the following account of Carob pods as a food stuff "These pods contain a large quantity of agreeably-flavoured, mucilaginous, and saccharine matter, and are commonly employed in the south of Europe for feeding horses, mules, pigs, &c, and occasionally, in times of scarcity, for human food During the last few years, considerable quantities of them have been imported into England and used for feeding cattle, but although they form an agreeable article

price, and were used by singers, who imagined that they softened and cleared the voice By fermentation and distillation, they yield a spirit which retains the agreeable flavour of the pod" Professor Church in *Food-Grains of India* (p 170) states that "The nutrient ratio is here about 1 85, and the nutrient value 68 As sugar, pectose, gum, &c, occupy the place of starch in these pods, the starch equivalent cannot be

TIMBER.
941
DOMESTIC.
Seeds.
942

CABINET WORK (Durianis)

CERBERA, Linn, Gen Pl, II, 699

Cerbera Manghas, Linn, see *Tabernaemontana dichotom*, Roxb,

[APOCYNACEÆ

943

C. Odollam, Gertn, Fl Br Ind, III, 638, Wight, Ic, t 441

Syn — C LACTARIA, Ham, TANGHINIA ODOLLAM, LACTARIA, and LAURI FOLIA, Don

Vern — Dabur, dhakur, BENG, Kada ma, kat arali, kadalalai, kadu, TAM, Odallam, MALA, Gon kaduru, SING, Ka lwah, BURN

References — Roxb, Fl Ind, Ed C B C 232, Brandis, For Fl, 322, Kurs, For Fl Burm, II, 171, Gamble Man Timb 252, Thwaites, En Ceylon

FIBRE.
Bark.
944
OIL
Seeds.
945
MEDICINE.
Sap.
946
Leaves.
947

Habit

C 947

Cerbera: The Yeast Plant.

CEREVISIÆ
Fermentum.

MEDICINE.

Nut.
948
Fruit.
949
Bark.
950TIMBER.
951DOMESTIC.
Ordeal Nut.
952

gative.

ally used for firewood

Domestic Uses.—The poisonous juice of the fruits was formerly used in Madagascar as an ordeal in cases of suspected crime or apostasy (*Kew Cat*, 96)

Cerbera Thevetia, *Linn*, see *Thevetia nerifolia*, *Juss*.

CEREALS.

953

the reader is information, such as the into Cereals or Pulses, such as buckwheat, amaranthus, &c.

from the
cereals
R.N., and
parately.

CEREVISIÆ FERMENTUM.

Cerevisiæ Fermentum.

954

YEAST PLANT OF TORULA CEREVISIÆ.

Reference.—*Pharm. Ind*, 262

The history of yeast is replete with interest, even although many of the details of the action of the plant in the process of fermentation are

955

undant
ated to
action
agent

with the sugary liquids, this must be viewed as a closely allied phenomenon to the effect of sulphuric acid on starch, contact converting the latter into sugar, while the acid itself remains unchanged in quantity or

CEREVISIÆ
Fermentum.

The Yeast Plant

chemical nature. In the process of beer-brewing two manifestations of the same kind are met with. The grain from which the beverage is to be prepared is first moistened either with hot water or by being placed in a warm confined atmosphere. As the result, it sprouts or germinates. The chemistry of this action consists in the fact that in a warm moist atmosphere the simple contact of a substance known as *diastase* with the starch of the grain converts the latter into sugar. Diastase may be defined as a transformed condition of gluten produced within the seed during the first stage of germination, and no sooner is the diastase formed than it immediately commences to act upon the insoluble starch. This is a wise provision of nature. The embryo plant is imbedded in a mass of starch. The base of the embryo contains gluten, but both starch and gluten are insoluble, and cannot be transformed into the structure

new substance is rapidly absorbed, and for the first period of its existence the infant plant feeds upon the food stored up for it within the seed. It

when the diastase completes its action on the still insoluble starch. It has been found that for every 100 parts of starch, in good malt, 1lb of diastase is produced, but that quantity will suffice to convert the starch of 1,000lb

brewer filters the wort, for the boiling has not only killed the diastase, but has also killed the embryo plant.

956

nourishment these minute plants take has never been clearly established,

in some respects better than the beers that used formerly to come to this country in such large quantities. The yeast is killed by the process of heating to 60°. In the brewing of beer only about a quarter of the fermentable substance is converted into alcohol, the remainder giving the

or *Torula Cerevisiæ*CEREVISIÆ
Fermentum

sweet flavour to the beverage. The yeast lives and increases in the fermenting liquid, but appears to abstract nothing from it, and just as contact of diastase has changed starch into sugar, so contact of yeast with sugar produces alcohol.

It has already been said that there would appear to be other sub-

957

958

and distilled. The flowers are placed in earthen vessels and mixed up |

for future use, having discovered that if not washed out these vessels |

Sarami lutur), to make the beverage intoxicating. According to some |
authors, an alcoholic beverage is prepared from the juice of *Calotropis* |

CFREVISIÆ
Fementum

The Yeast Plant.

959

shown that the substances indicated are after all only flavouring ingredients or at most auxiliaries to fermentation; but in that case the true fermentation of substances of sweet liquids, since, with the to, no other instance is known

960

ru beer from rice. A log of wood 20 feet in length and 3 feet in thickness is hewn out into a large trough. This is placed in the centre of the village, constituting the communal brewery. A large quantity of water is poured when on the trough

961

Afghanistan from raisins. But apparently wheat and barley are but rarely used for this purpose, the liquor from the former being called *Madulika* and from the latter *Kohala*.

962

In India the favourite beverages are prepared from the juices of trees, chiefly palms (*Vāruni*), or from sugar-cane (*Sidhu*). For this purpose the juice is extracted from the cocoanut, the date, the palmyra, *Caryota urens*, and the *nim* tree. Fermentation is generally set up in these beverages by means of fermentation seed. This consists of rice saturated in a former fermentation, the grains of rice retaining apparently the germs of the yeast plant. Yeast from the *tari* beverage is largely used

MEDICINE
963

cessfully used
It is chiefly used as a poultice. In India, where yeast is rarely procurable, the toddy (*tari*) poultice, in a great measure, answers the purpose. (*Pharm Ind.* see also the fermentation seed of *Borassus*, B. 689)

C. 963

The Mangrove.

CEROPEGIA
Arnottiana.

CERIOPS, Arn.; Gen. Pl., I, 679.

Ceriops Candolleana, Arnott, Fl. Br. Ind., II, 436; Wight, Ic.,
[t. 240; RHIZOPHOREÆ.

THE MANGROVE.

Vern.—Kurrari, kivi, chauri, SIND; Gorán, BENG; Mada, AND.

References.—Brandis, For Fl. 218, Kura, For Fl. Burm., I, 448, Bed-
domi, Fl. Sylva Anal., Pl. XIII, Fig 5, Gamble, Man. Timb., 176,
Thwaites, En. Ceylon Pl., 120, Atchison, Cat. Ph. Pl., 50, Murray,
Fl. and Drugs, Sind, 190

Habitat.—A small, evergreen tree, met with on the muddy shores and

964

DYE.
905TAN.
906MEDICINE.
Plant.

967

Bark.

905

Shoots.

960

TIMBER.

970

Litter for

Cattle.

971

972

decoction of the BARK is used to stop hæmorrhage, and is applied to
malignant ulcers. On the African coast, a decoction of the SHOOTS is
used as a substitute for quinine.

Structure of the Wood.—Red, hard, weight, 63lb per cubic foot. Used
in Sind for the knees of boats and other similar purposes; in Lower
Bengal for houseposts and for firewood

Domestic Uses.—The bark is used as a litter for cattle.

C. Roxburghiana, Arnott; Fl. Br. Ind., II, 436.

Vern.—Garán or Ghorán, BENG; Kabasing, Kyobasing, ka-pyaing, BURM.

References.—Kura, For Fl. Burm., I, 448; Gamble, Man. Timb., 176;
McCann, Dyes and Tans, Beng., 133, 158, 458.

Habitat.—A large shrub of the coast of Chittagong, down to Tenas-
serim (Kura)

TAN.

Bark.

973

DYE.

Bark.

974

cloths (McCann)

Structure of the Wood—Weight of the wood, 46lb per cubic foot.

TIMBER.

975

976

CERIUM.

This metal is used medicinally in India. Minerals supposed to contain
it have been collected in the Karnal district, in Madras, and in Nepal
(See Ball's Econ. Geology).

CEROPEGIA, Linn.; Gen. Pl., II, 779.

Ceropegia Arnottiana, Wight; Fl. Br. Ind., IV, 74; ASCLEPIADÆÆ.

Vern.—Uta-long, BURM.

977

CHÆTOCARPUS
castaneæcarpus

Ceropegia Iceland Moss

Reference — *Balfour Cyclop*

Habitat — Grows in Khásia Mountains, Burma, and Tenasserim

978

Ceropegia bulbosa, *Roxb*, var *esculenta*, *Fl Br Ind*, IV, 67,
[*Wight, Ic*, t 845]Vern — *Khappar kadu*, HIND, *Palalatum bari* BOMBReferences — *Roxb Fl Ind*, Ed C B C, 250; *Dals & Gibs Bomb Fl*, 153; *Voigt Hort Sub Cal* 534; *Dymock Mat Med W Ind* 2nd Ed, 526; *Isboea, U Pl of Bomb*, 165; *Balfour, Cyclop*

Habitat — Met with in the Panjáb and in the Bombay Presidency

Food — **TUBERS AND LEAVES** are used as pot-herbs in Multan and Sind. Shepherds are fond of eating the tubers, which they consider to be tonic and digestive. "Every part of this plant is eaten by the natives, either raw or stewed in their curries. The fresh roots taste like a raw turnip" (*Roxburgh*)FOOD
Tubers

979

Leaves

980

Roots

981

982

C. tuberosa, *Roxb*, *Fl Br Ind* IV, 70Syn — **C. ACUMINATA**, *Dals & Gibs*, l c. not of *Roxb*Vern — *Khappar kadu*, BOMB, *Pálál tumbdi*, MAR. *Commumadu*, TELReferences — *Roxb, Fl Ind*, Ed C B C, 251; *Dals & Gibs Bomb Fl*, 153; *Dymock Mat Med W Ind* 436; *Murray, Pl and Drugs Sind* 162; *S. Arjun Bomb Drugs*, 85

Habitat. — Met with in the Deccan Peninsula from the Konkan southwards

MEDICINE

Tubers

983

appl. cable to both plants and perhaps to one or two other species such as **C. juncea** and **C. acuminata****Cetaceum**, see *Physeter macrocephalus*, *Linn*, MAMMALIA

984

Cervidae, the family of the deer of interest economically for their antlers and their skins. See 'Horns' and also 'Skins'**CETRARIA.**

985

Cetraria islandica, *Achar*, LICHENES.

ICELAND MOSS

References — *Pharm Ind* 258; *Flück & Hanb Pharmacog* 737, *O'Shaughnessy Beng Dispens*, 672

Medicine — Imported into India and sold in chemists' shops

MEDICINE

986

Cevadilla or **Sabadilla**, see *Asagraea officinalis*, *Lindl*, LILIACEÆ**Ceylon Moss**, see *Gracillaria (Plocaria) lichenoides*, *Greville*, ALGÆ**CHÆTOCARPUS**, *Thw Gen Pl*, III, 323

987

Chætocarpus castaneæcarpus, *Thw*, DC *Prodr*, XV, 2, 1127,
[EUPHORBIACEÆ]Vern — *Bullokra* BENG, *Palakuna, sadavaku*, TAM, *Hedbaka, hédawaka* SING**C 987**

Chara and Nitella.

CHARA
involucrata.

References — *Kurz For Fl Burm*, II 429 *Gamble Mac T* 16, 366,
Thwaites, En Ceylon Pl 275, *Trimen System. Cat*, Ceylon Pl, 82

Habitat — A moderate-sized tree, found in the Khasia Hills, Eastern Bengal, Burma, the Andaman Islands, and Ceylon

Structure of the Wood — Light red, moderately hard, close-grained, weight 58 lb per cubic foot, used in Ceylon for building

TIMBER.
988

CHAILLETIA, DC, *Gen. Pl*, I, 341.

Chaillietia gelonioides, Hook, *Fl Br Ind*, I, 570; CHAILLETIACEÆ

989

Syn — *Moaakurra gelonioides* Roxb, *Fl Ind*, Ed C B C, 264

Vern. — *Moaakurra*, SILHET, BENG, *Bala nakuta*, SING

References — *Kurz, For Fl Burm*, I, 230 *Gamble, Man Timb*, 80,
Bedd, Fl Sylv 59, *Thwaites En Ceylon Pl*, 79, *Trimen, System Cat*
Ceylon Pl, 17, *Dalziel & Gibb, Bomb Fl*, 52 *Lisboa U Pl Bomb* 47

Habitat — A small subdioecious tree, commonly met with in the hilly eastern parts of Bengal and Silhet, in the forests of Madras, and in the Western Peninsula on the Ghats from the Konkan southwards, it is also met with in the moister parts of Ceylon up to an elevation of 3,000 feet

Structure of the Wood — This is one of the timber trees specially mentioned by Dr Lisboa in his *Useful Plants of the Bombay Presidency*, but very little of a definite character can be learned regarding the value of the wood

TIMBER.
990

Chalcedony, see Carnelian

Chalk, see Carbonate of Lime

CHAMÆEROPS.

991

Chamæerops Ritchieana, Griff, *Gen. Pl.*, III, 924; see *Nannorhops Ritchieana*, PALMÆ

Chamois Leather, see Leather & Skins.

Chamomile or Camomile, see *Matricaria Chamomilla*, Linn; COM-

Chanáy Kélengu, see *Tacca pinnatifida* (?) [POSITÆ

Chank shells, see Shells and also Pearl Fisheries

CHARA.

Chara involucrata, Roxb, *Fl Ind*, Ed C B C, 648

992

Vern. — *Jangli pata*, HIND, *Jhang*, BENG (These vernacular names are applicable to all *Charas*, indeed to most submerged plants)

Habitat — There are a large number of species both of *Chara* and *Nitella* found in tanks and pools of water near Calcutta during the cold and hot season

Domestic use — *Atkinson* ; *Roxb*, is employed use this is used in the finished *Atkinson*, *Roxb*

DOMESTIC.
Clarify
sugar.
993

CHARCOAL.

Timbers used for Charcoal.

Charcoal, see Carbon.

994

CHARCOAL, Timbers used for—

Abies Smithiana.
Acacia arabica.
A. Catechu
A. modesta
Adhatoda Vasica (gunpowder)
Albizzia procera.
A. stipitata.
Anacardium occidentale
Anogeissus latifolia.
Betula cylindrostachys
Boswellia serrata.
Butea frondosa (gunpowder)
Cajanus indicus (gunpowder)
Callicarpa arborea.
Calotropis gigantea.
Casearia glomerata.
Cassia Fistula.
Castanopsis tribuloides.
Colebrookia oppositifolia (gunpowder)
Corchorus capsularis (gunpowder)
Cornus macrophylla (gunpowder).
Cynometra polyantha
Daphne mucronata (gunpowder)
Dillenia indica.
D. pentagyna.
Echinocarpus dasycarpus
Ehretia Wallichiana.
Elæocarpus lanceifolius.
Eucalyptus Globulus
Eugenia tetragona
Euphorbia antiquorum

Excæcaria Agallocha
Ficus cordifolia.
F. infectoria.
F. religiosa.
Hippophae rhamnoides
Juniperus excelsa.
Lagerstrœmia parviflora.
Mangifera indica
Mimosa rubicaulis (gunpowder).
Phyllanthus Emblica.
Ptern ovalifolia.
Pinus excelsa.
P. longifolia
Premna latifolia.
Prosopis glandulosa.
P. spicigera
Quercus Ilex.
Q. lacana.
Q. semecarpifolia.
Q. spicata.
Rhododendron arboreum.
Salix tetrasperma (gunpowder)
Semecarpus Anacardium.
Sesbania ægyptiaca (gunpowder)
Sponia orientalis (gunpowder)
S. politoria (gunpowder)
Stereospermum suaveolens
Tamarix articulata.
Terminalia myriocarpa
T. tomentosa
Xylosma longifolium.

995

tion of *Anogeissus* and *Boswellia*, are not specially mentioned by writers on the subject as being good for fuel. These trees may, however, be added to the above list. Dr Schlich, in his note, estimated that to produce 15 tons of pig iron a day, 372,604 maunds of charcoal would be annually required, or say 1,800,000 maunds of firewood.

Chaulmugra, see *Gynocardia odorata*, *R. Br.*, BIXINÆ.

Chavannesia esculenta, *A DC.*, see *Urceola esculenta*, *Benth.*

Chavica Betle, *Miq.*, see *Piper Betle*, *Linn.*, PIPERACEÆ

C. officinarum, *Miq.*, see *Piper officinarum*, *C DC.*

C. Roxburghii, *Miq.*, see *Piper longum*, *Linn.*

Chay root, see *Oldenlandia umbellata*, *Linn.*, RUBIACEÆ.

C. 995

The Wall-flower: The White Goose-foot

CHENOPODIUM
album.

Cheep, see Shells

Cheeronjee (chironji or chiraufi) oil, see *Buchanania latifolia*, Roxb.;

Cheese, see Ghl.

[ANACARDIACEÆ.]

Cheilanthes tenuifolia, Sw.; FILICES.Vern.—*Nanha, dadhari*, SANTAL.

The Reverend A. Campbell writes that the Santals prescribe a preparation from the roots of this fern for sickness attributed to witchcraft or the evil eye.

996

CHEIRANTHUS, Linn.; *Gen. Pl.*, I., 68.*Cheiranthus Cheiri*, Linn.; *Fl. Br. Ind.*, I., 132; CRUCIFERÆ.

997

THE WALL-FLOWER.

V.

References.—*Stewart, Pb Pl.*, 13; *O'Shaughnessy, Beng. Dispens.*, 1861

Habitat.—Cultivated in gardens in North India, but is not indigenous; known as "Viole gialle," or yellow violets.

pur
eneOIL.
Flowers,
998MEDICINE,
Flowers,999
Petals.1000
Seeds.

1001

son, M D, *vignor*). iphrodisiac" (Surgeon J. Ander-CHENOPODIUM, Linn.; *Gen. Pl.*, III., 51.

1002

A genus of annual or perennial herbs, belonging to the Natural Order
CHENOPODIACEÆ.too
Sty.d or
ssed.

There are about 50 species of the genus, met with in the world. These are distributed in all climates. India possesses seven species, with perhaps numerous varieties and cultivated forms of most of these.

Chenopodium album, Linn.; *Fl. Br. Ind.*, V., 3; CHENOPODIACEÆ.

1003

THE WHITE GOOSE-FOOT.

Syn.—*C. VIRIDE*, Linn.; *Roxb. Fl. Ind.*, II., 38.

C. 1003

Mexican Tea The Jerusalem Oak.

CHENOPODIUM
Botrys.

Domestic Uses —Baden Powell says that this plant is used in the Panjab "to clean copper vessels preparatory for tinning them"

DOMESTIC.
1008

Chenopodium ambrosioides, Linn, *Fl Br Ind*, V, 4.

1009

THE SWEET-PIGWEEED, MEXICAN TEA

Syn —*C. VALPINUM*, Wall, *AMBRINA AMBROSIOIDES*

Vern —*Herba Santa Maria* in Brazil In Chib this is known as *Culen*

References —*Dals and Gids, Bomb Fl Suppl*, 73, *Bent and Trim*, Med Pl, 216

racemes

Medicine —This is said to afford an essential oil to which the tonic and antispasmodic properties of the plant are attributed It is commonly reported that this plant is used as a substitute for the official *C. anthelminticum*, having in a milder degree the anthelmintic properties of that plant It is employed in pectoral complaints and enjoys the European reputation as a useful remedy in nervous affections, particularly chorea Official preparation an infusion

MEDICINE.
Oil
1010

various species not being distinguished

Food.—This plant affords the Mexican tea.

C. Blitum, Hook f, *Fl Br Ind*, V, 5

Syn —*BLITUM VIRGATUM*, Linn

Vern —*Sundar* (J), *kupald* (C), Pa

References —*Stewart, Pb Pl*, 177; *Von Mueller, Extra Tropical Plants*

Habitat —North Western India • Kashmir, altitude 8500 feet and Stewart found the plant wild in the Trans-Indus at altitudes

FOOD.
1011
1012

ie fruits furnish a red dye "

Food —Stewart remarks that "the extremely insipid fruit is sometimes mistaken by Europeans for a kind of strawberry, and which it much resembles. In Ladak the LEAVES are eaten as a pot herb "

DYE.
1013
FOOD.
Fruit.
1014
Leaves.
1015
1016

C. Botrys, Linn, *Fl Br Ind*, V, 4

THE JERUSALEM OAK

Syn —*C. ILICIFOLIUM*, Griff *Notul*, IV, 337

References —*Dals & Gids, Bomb Fl Suppl*, 73

Habitat —Temperate Himalayas from Kashmir to Sikkim at altitudes from 4,000 to 10,000 feet Tibet 11,000 to 14,000 feet Stewart says it occurs at Peshawar, and Dalzell that it was originally introduced into Bombay but has now gone wild. A weed of fields

Medicine —Reported to be used as a substitute for *C. anthelminticum* and to possess the same properties as *C. ambrosioides* According to *U S Dispensatory* it has been used in France with advantage in catarrh and humoral asthma The official preparation is an oil.

MEDICINE.
Oil
1017

C. 1017

CHICKRASSIA
tabularis

The Quinoa: The Chittagong Wood.

1018

Chenopodium murale, Linn ; *Fl Br. Ind*, V, 4.Vern — *Bátá, káránd, kharafua*, PsReferences.—*Stewart, Ph Pl*, 178

FOOD.

1019

Habitat — General in many parts of India from the Panjab to the Gangetic Valley, the Deccan, and South India.

1020

Food — Used as a pot-herb in the Panjab

C Quinoa, an American species, has once or twice been tried in India, but apparently with little success (*See Church, Food Grains of India*, p 110)Cherry, see *Prunus Cerasus*, Linn., ROSACEÆ.Chestnut, Horse, see *Æsculus indica*, Colebr (A 567), and *Æ. Hippocastanum*, Linn (A. 573); SAPINDACEÆ.Chestnut, Sweet, see *Castanea vulgaris*, Lam, CUPULIFERÆChestnut, Water, see *Trapa bispinosa*, Roxb, and *T. nutans*, Linn.
ONAGRACEÆCHICKRASSIA, A Juss, *Gen Pl*, I, 339

1021

Chickrassia tabularis, Ahr Juss ; *Fl Br Ind*, I, 568, *Beddome, Fl Sylhet*, t 9, MELIACEÆ

THE CHITTAGONG WOOD

Syn. — *SWIETENIA CHICKRASSIA*, Roxb, *Fl Ind*, Ed C B C, 370, C

Habitat — A large tree, native of the hills of Eastern Bengal, South

GUM.

1022

DYE.
Flowers.

1023

MEDICINE
Bark

1024

TIMBER

1025

It is used for ever
"The wood is
extensively used

C. 1025

The Chittagong Wood Chlorophytum

CHLOROPHYTUM
breviscapum

'Chittagong wood,' being imported from that district, though it is abundant in the mountainous parts of the peninsula. It is close grained

but tough and close grained, and, from its general situation, it is hardly known to the carpenter. It grows in the warmer parts of Ceylon" (*Balfour, Cyclop*)

Chicory, see *Cichorium Intybus*, *Linn*, COMPOSITÆ

China Root, see *Smilax china*, *L*, LILIACEÆ

Choinanthus albidiflora, *Thw*, see *Linociera albidiflora*, *Thw*

C zeylanica, *Linn*, see *Linociera purpurea*, *Vahl*, OLEACEÆ

Chireta, see *Swerthia Chirata*, *Ham*, GENTIANACEÆ

Chloride of Ammonium, see *Ammonium chloride*.

Chloride of sodium, see *Sodium chloride*

CHLORIS, *Sw*, *Gen Pl*, III, 1165

Chloris barbata, *Swartz*, *Duthie*, *Fodder Grasses*, 53, GRAMINEÆ

1026

Syn — *ANDROPOGON BARBATUS* *Linn*

Vern — *Gandi* " " " " " " " " " " " "

jharna Pa

PUR Bardi

SOUTH INDIA

References —

371 *Dals* &

Murray Pl *Orings*, 51 & 12 *India*, *Cat New Prod*, *Paris Exh*, 76

grows

hey do

FODDER.

1027

1028

CHLOROPHYTUM, *Ker*, *Gen Pl*, III., 788

Chlorophytum breviscapum, *Dals* in *Kew Journ*, II, 142,

1029

[LILIACEÆ

Vern — *Bimpel* *Sing*

References — *Dals & Gibz Bomb Fl*, 252 *Thwaites*, *En Ceylon Pl*, 339, *Baker*, *Linn Soc*, XV, 321, *Treasury of Botany*, II, 1280

Habitat. — Frequent in the Malwan District, Bombay, in rocky situations. *C Heynel Baker*, a newly allied species met with in the southern and central parts of Ceylon, at no great elevation

C 1029

CHLOROXYLON
Swietenia.

The Indian Satin-wood.

MEDICINE
Bals.
1030

ascending the Himalaya to 3,000 feet in altitude. *C. nepalensis* occurs in the eastern sub-tropical Himalayas, while *C. arundinaceum* occurs on the sub-tropical Himalaya and on Parasnath in Behar, altitude 4,000 feet

1031

CHLOROXYLON, DC ; Gen Pl, I, 340
Chloroxylon Swietenia, DC, Fl Br Ind, I, 569; Beld., Fl Syl-
zot, t 11, Wight, Ic, t 56; MELIACEÆ.

THE INDIAN SATIN-WOOD

Syn.—SWIETENIA CHLOROXYLON, Roxb Fl Ind, Ed. C B C, 370

Vern.—Dhaura, dhura, girya, HIND, Behru, biluga, bhavru, bheyl, URIYA, Behra, girya, behru, bheyl, bhura bhura C. P., Seneel sa's, KOL, Baarhal, KARWAR, Bhira, GOND, Bhira Baigas, Hukda, billa, hardi, bheria, BOMB, Halda, bheria, MAR, Mudada, burus, purush-mudada marum, purush-burus, tummay, mudada, tummaai pora-

burute, BING

References.—Brandis, For Fl, 74 Gamble, Man Timb, 77, Thaxartes, En Ceylon Pl, 61 Dals & Gils Bomb Fl, 39, Vingt, Hort Sub Cal, 137 Dymock, Mat Med W Ind, 2nd Ed, 177 Drury, U Pl, 131 Cooke, Gums and Gum resins, 25, 115 Atkinson Gums and Gum resins, 34 Atkinson, Him Dist, 814 Lusbo, U Pl, Bomb, 4, Bal four, Cyclop, Treasury of Botany Ann Cal 22.

Habitat.—A moderate-sized, deciduous tree, found in Central and South India, and Ceylon Common in the forests of the Konkan, Decan, and Coromandel, flower in March

GUM
1032

Gum.—"Satin-wood gum was contributed by Dr Cleghorn to the Madras Exhibition of 1853 The specimen in the collection from Salem (1873) refer tears, very lucent, bro ble in water mahogany

surface of the solution

"Another sample in the reference collection is from Ceylon, paler in colour, and in definite, rounded, shining, amber-coloured tears" (Cooke, Gums and Gum-resins, 25).

Dye.—"Yields a yellow dye" (C. P. Gaz, '03)

Oil.—The tree yields a wood-oil (Beddom)

Medicine.—"The astringent BARK is prescribed sometimes by Hindû

DYE
1033
OIL
1034
MEDICINE.
Bark.
1035
Leaves
1036
TIMBER
1037

56lb per cubic foot.

C. 1037

Garden Chrysanthemums.

CHRYSANTHEMUM.

SATIN-WOOD

very str
as it me
the bro
a ton, c
furnitur
of 8 to
kotties
district

kotties part of the satin wood cut is exported to Madras, where it is used for furniture and general building purposes" (*Indian Forester*, X, 1 38)

Chocolate nut and bean, see *Theobroma Cacao*, Linn, STERCULIACEÆ

CHONEMORPHA, Don, *Gen Pl*, II, 720

Chonemorpha macrophylla, G Don, *Fl Br Ind*, III, 661,
[Wight, *lc*, t 432, APOCYNACEÆ

Syn — *ECBITES MICROPHYLLA* Roxb, *Fl Ind*, Ed C B C, 245

Vern — Garbadero, Hind, Yokchounrik, Lereha, Hark, SYLHET

References — Brandis, *For Fl*, 329, Kurz *For Fl Burm II*, 187
Gamble *Man Timb*, 261 Dala & Gids, *Bomb Fl*, 146, Vocht, *Hort*
Sub Cat, 523, Balfour, *Cyclop*

Habitat — A large climber with milky sap, met with in North and East

the leaves of
and the roots
The Flora of

GUM
1030
MEDICINE
1040

British India alludes to that plant as a doubtful species

Chowli, or Chauli, see *Vigna Catiang*, Endl, LEGUMINOSÆ.

CHROMIUM AND CHROMITE.

The metal Chromium

of
in
suc
in
is

information see Davis *Lon Geology*, 331. Mauet, *Mineralogy*, 53.
Balfour's Cycl, 717

CHRYSANTHEMUM, Linn, *Gen Pl*, II, 424

There are three wild species belonging to this genus met with in Western Thibet and one in upper Sikkim—all alpine in their character, never occurring below 9000 feet The Chrysanthemums of Indian pharmacy are the two garden species

C 1042

1041

1042

CHRYSANthemum indicum.

The Common Garden Chrysanthemum.

1043

Chrysanthemum coronarium, Linn ; Fl Br Ind, III, 314, Bot
CHRYsanthemum [Mag, t. 1521; COMPOSITEÆ.
Syn — C. Borealis, DC Prodr, VI, 62, CHRYsanthemum
Ve
CYNACEÆ
Defens — P6
99,
183,
It is not one of the Medicinal plants of India

almost naturalised in India, and to such an extent that Roxburgh viewed them as "natives of Bengal"

Medicine.—"The FLOWERS are stated by Dalzell and Gibson to form The Root

MEDICINE
Flowers,
1044
Root.
1045

(Pharm Ind)

an agent for opening the mouths of wounds" (Murray, Plants and Drugs of Sind)

Sacred Uses — "The beautiful yellow fragrant flowers of this plant are made into garlands and offered at the shrines of Vishnu and Siva" (Balfour)

Garlands.
1046

1047

C indicum, Linn ; Fl Br Ind, III, 314; Bot Mag, t 327, 2042,
THE COMMON GARDEN CHRYsanthemum OF INDIA [2556
Syn — PYRETHRUM INDICUM, DC Prodr, VI, 62, CHRYsanthemum
INDICUM Willd in Roxb Fl Ind, Ed, C B C, 604
Vern.—Gul dāudi, HIND, a name applied, according to Roxburgh, to all
the varieties, Gendi, bāgdur (genda is the Hindustani for Tagetes erecta),
Pa, Kalsang, LADAK, Chevati akurkura, BOMB; Shevati, MAR;
Akkara carum, TAM, Chamunti, TEL

C. 1047

Chrysanthemum. Fodder Grasses.

CHRYSOPOGON
aciculatus

References — *Roxb, Fl Ind, Ed C B C, 601, Clarke, Composita Ind, 145, Dals & Gals, Bomb Fl Supp 48, Stewart, Pb Pl, 124; S Arjun, Bomb Drugs, 192, Baden Powell, Pb Pr, 358, Birdwood, Bomb Prod, 50*

Habitat.—Commonly cultivated in Indian gardens, and is in fact only

MEDICINE,
Flowers
1048

gonorrhœa

Sacred Uses.—The flower-heads are sacred to Vishnu and Siva.

Garlands,
1049

CHRYSOPHYLLUM, Linn, Gen Pl, II, 653

Chrysophyllum Roxburghii, G Don, Fl Br. Ind, III, 535;
Bedd, Fl Sylv, t 236, MELIACEÆ

1050

THE STAR APPLE

Syn — C ACUMINATUM, Roxb, Fl Ind, Ed C B C, 201

Thwaites En Ceylon Pl 174, Dals & Gals, Bomb Fl 138, Voigt,
Hort Sub Cal, 340; Lisboa, U Pl Bomb, 88, Balfour, Cyclop

Habitat — An evergreen tree of Bengal, Burma, the Western Ghâts, and Ceylon

Food — FRUIT edible Roxburgh says "The fruit ripens in October,

FOOD
Fruit
1051

TIMBER
1052

General use (DUMU GAS, LV, pl 1, 00)

CHRYSOPOGON, Trin, Gen Pl, III, 1135.

Chrysopogon aciculatus, Trin, Duthie, Fodder Grass, 39, GRAMINEÆ

1053

Habitat — A small, coarse grass, growing on barren, moist pasture

Fodder.—Cattle do not seem to like it. Its thin, straight culms, 1 to 2 feet high, flower, and the small spikelets of awned, barbed, fruits which follow, are troublesome to those who walk through the grass, as they stick

FODDER,
1054

T

C. 1054

CHRYSANthemum
indicum.

The Common Garden Chrysanthemum

1043

Chrysanthemum coronarium, Linn ; Fl Br. Ind, III, 314, Bot
CHRYSANthemum [Mag, t 1521; COMPOSITE.

Syn — C. B. Ind, III, 314, Bot Mag, t 1521; COMPOSITE.

Ve

I

.

CYNACEÆ

References — Dals & Gibs, Bomb Fl Supp, 48, Aitchison, Cat Pb
Pl, 77, Pharm Ind, 127; Moondeen Sheriff, Supp Pharm Ind, 99,
Dymock, Mat Med W Ind, 371, Murray, Pl and Drugs, Sind, 183,
S Arjun, Bomb Drugs, 79, Drury, U Pl, 133, Balfour, Cyclop

The plant is native of the Mediterranean region, and is now a native of India

almost naturalised in India, and to such an extent that Roxburgh viewed
them as "natives of Bengal"

Medicine — "The FLOWERS are stated by Dalzell and Gibson to form

MEDICINE
Flowers.

1044

Root.

1045

(Pharm Ind)

Garlands.

1046

of Siva)

Sacred Uses — "The beautiful yellow fragrant flowers of this plant
are made into garlands and offered at the shrines of Vishnu and Siva"
(Balfour)

1047

C indicum, Linn ; Fl Br Ind, III, 314; Bot Mag, t 327, 2042,
THE COMMON GARDEN CHRYSANthemum OF INDIA [2556Syn — PYRETHRUM INDICUM, DC Prodr, VI, 62 CHRYSANthemum
INDICUM Willd in Roxb, Fl Ind, Ed, C B C, 604V. Roxburgh, toall
Tagetes erecta),
Shevath, MAR ;

C. 1047

Chrysanthemum Fodder Grasses

CHRYSOPOGON
aciculatus

References — Roxb *Fl Ind*, Ed C B C 604 Clarke *Compositae Ind*, 145 Dals & Gibs, *Bomb Fl Supp* 48 Stewart *Fb Pl* 124, S Arjun *Bomb Drugs*, 192 Baden Powell, *Pb Pr*, 358, Birdwood *Bomb Prod*, 50

Habitat — Commonly cultivated in Indian gardens, and is in fact only

MEDICINE
Flowers
1048

calculus and also to remove depression of spirits Drury says the "natives of the Deccan administer the plant, in conjunction with black pepper, in gonorrhœa"

Sacred Uses — The flower heads are sacred to Vishnu and Siva

Garlands
1049

CHRYSOPHYLLUM, Linn, *Gen Pl*, II, 653

Chrysophyllum Roxburghu, G Don, *Fl Br Ind*, III, 535, Bedd, *Fl Sylv*, t 236, MELIACEÆ

1050

THE STAR APPLE

Syn — C ACUMINATUM Roxb, *Fl Ind* Ed C B C 201

Vern — Petakara BENG, Pithogarkh ASS Hali, hali-maru KAN, Tarsu, tarsuphala DOMB, Tarsu, MAR, Lawulá SING, Thankya, than kya

b, 242,
Voigt,

Habitat — An evergreen tree of Bengal, Burma, the Western Ghâts, and Ceylon

Food — FRUITEDIBLE Roxburgh says "The fruit ripens in October,

FOOD
Fruit
1051

CHRYSOPOGON, Trin, *Gen Pl*, III, 1135

Chrysopogon aciculatus, Trin, Dulhie, Fodder Grass 39, GRAMINEÆ

1053

Syn — ANDROPOGON ACICULATUS Linn (? Rel.) Roxb, *Fl Ind*, Ed

Habitat — A small, coarse grass, growing on barren, moist pasture

TIMBER
1052

Fodder — Cattle do not seem to like it Its thin straight culms, 1 to 2 feet high flower, and the small spikelets of awned barbed, fruits which follow, are troublesome to those who walk through the grass, as they stick.

FODDER.
1054

T

C 1054

CICER
arietinum.

Fodder Grasses The Common Gram

to the stockings and produce until removed a pricking and itching sensation As soon as the spikelets appear cattle refuse to eat the grass

1055 *Chrysopogon coeruleus*, *Nees*, *Duthie, Fodder Grasses*, p 39

Syn — *RHAPHIS COERULEA* *Nees*

Vern — *Dhaulian* *Pb Khar*, SALT RANGE *Dhaulia* *SIWALIK RANGE*, *Ghweia*, KUMAON, *Tigri*, BUNDELKHAND, *Palla paggar gadi*, CHANDA, *Jhingra ka jhara*, *khidi*, BERAR

Habitat. — A common grass on the hilly tracts of Northern India, usually on stony or sandy soils

Fodder — On the Siwalik range it is extensively used as fodder

FODDER.

1056

1057

C. gryllus, *Trin*, *Duthie, Fodder Grasses*, 40

Syn — *C ROYLEANUM*, *Nees* *ANDROPOGON GRYLLUS*, *Linn*

Reference — *Atchison, Cat Pb Pl*, 176

Habitat — The plains and hills of the Panjab and N-W Provinces

Fodder — *Mueller* says it is a useful fodder grass in Australia

FODDER.

1058

1059

C. montanus, *Trin*, *Duthie, Fodder Grasses*, p 40.

Syn. — *C PARVIFLORUS*, *Benth*, *ANDROPOGON MONTANUS*, *Roxb*

Vern — *Ballak* *RAJ*

Habitat — The hilly parts of Northern India (Mount Abu)

Fodder — In Rajputana it is said to be viewed as excellent fodder, and the grain is also sometimes collected and eaten by the natives

FODDER

1060

Cicca disticha, *Linn*, see *Phyllanthus distichus*, *EUPHORBACEÆ*

Cicendia hyssopifolia, *W & A*, see *Enicostema littorale*, *Blume*,
[*GENTIANACEÆ*]

1061

CICER, *Linn*, *Gen Pl*, I, 524

Cicer arietinum, *Linn*, *Fl Br Ind II*, 176, *Wight Ic*, t 20

[*LEGUMINOSÆ*]

THE COMMON GRAM OR CHICK PEA, *CECE It* *GARBANZOS*, *Sp*

Vern — *Chola bét*, *but kalat* *BENG* *Chana chunna* *HIND But*,
SANTALI Channa chola, *Pb Chola chana* *RAJPUTANA, Chana*

or Chick Pea

CICER
arietinumthe *εβίον* of Dioscoridesto a not
in the poc
"gram"

where it

kurti (Do

33) In I'

Phaseolus "

Bengal gram. These terms are however, unknown in other provinces,
where the word "gram" is exclusively given to the pea of *Cicer*

History—The

the Greeks in Homer's
Romans as *Cicer* and the
that it was early known
Europe. It is supposed
to be from the very earliest

HISTORY

time of the

lik

du

int

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Eu

Th

fro

ground where we do not know whether it springs from a stock originally
wild or from cultivated plants (DC, Orig Cult Pl)

CULTIVATION

N W Provinces—The varieties grown in the North Western Pro
vinces are placed as followsCULTIVA-
TION

N W P

Large

1062

Small

1063

Cabuli

1064

The soil for gram varies from the
heaviest clay to the lightest loam, but it is found to prefer the former.
It does not require so fine tillage as wheat and barley do, nor much
irrigation and a deep rather than well pulverised seed bed is all that is
necessary. The plants bushy like the

The cost of

follows—

Ploughing (four times)

Seed (Solt)

Sowing

Reaping

Threshing

Cleaning

Rs a p

3 0 0

2 0 0

0 14 0

1 9 0

2 0 0

0 6 0

TOTAL

9 13 0

Rent

3 0 0

GRAND TOTAL

12 13 0

CICER
arietinum.

The Common Gram

CULTIVA-
TION.

The approximate average outturn for unirrigated land in the several divisions varies from 5 to 8 maunds per acre in the case of gram, and from 6 to 9 maunds in the case of gram barley and gram-wheat. For irrigated land the outturn is estimated at 12 maunds for gram alone,

C. P
1065

est return was in Narsinghpur, where 873lb to the acre were obtained, and the lowest, 237lb, in Chanda. Taking the mean of all the returns in the eleven districts the yield may be expressed at 557lb. In the Chanda Settlement Report, it is stated that two kinds of gram are grown—the grey and the white. It is remarked that gram is not a popular crop in the Wardah District.

BOMBAY.

Bombay—There are 692,295 acres under this pulse, and in Sind 34,166 acres. The crop experiments made in the Bombay Presidency reveal

Large
1066
Small
1067Kills weeds
Improves soil

The following extracts from the Bombay Gazetteers will be found

Justification
of mixed
cropsWheat and
Gram

planned of by European merchants is the consequence of either of two things—1st, the wilful purchase of such admixture, for the natives of India regularly eat the two grains mixed, and to meet this demand the Indian

seems every reason to suppose that a certain amount of wilful—one might almost say criminal—admixture of gram takes place in wheat sold as pure wheat. Such admixture is mainly, if not entirely, effected by the dealer not by the cultivator.

C. 1067

or Chick Pea.

CICER
arietinum.CULTIVA-
TION.is the most
district. It
either water
to be used

Hols.

1068

Dal

1069

Puran-poll.

1070

Phutanas.

1071

manured and irrigated lands In Belgaum gram is known as *kadli* in

p. 151).

In the

grown
soils Pr
wheat.The amount of seed to the acre varies from 32 to 48 lb. Rain in March
and April, so beneficial for wheat, and indeed abundant rain or prolonged
cloudy weather at any
causes the plant to s;PANJAB
1072

Red

1073

Black.

1074

White.

1075

Cabul.

1076

C. 1076

CICER
arietinum.

The Common Gram

CULTIVA-
TION.

gram are sown at the same time as wheat

gram are sown at the same time as wheat

Phall

1077

Amin

1078

Improves
soil

rabi crops. The effect of gram
 "The crop is not only profit-
 e and improve the land for the

RAJPUTANA

1079

CENTRAL

INDIA

1080

BENGAL

Straw-colour-

ed

1081

Kabul

1082

In Rajputana and Central India, gram is also grown, and especially
 along with wheat. There is nothing, however, of a special nature to
 record

Rajput — Gram is sown at the same time as wheat

ery
 here
 or
 eat
 tele
 or

e land, fine pulverisation of the soil

BURMA.

1083

2½ *In Burma —* Mason says gram is grown extensively by the Burmese
 GRAM AS A ROTATION WITH WHEAT — In a recent lecture, on Indian

or Chick Pea

CICER
arietinum

what has been said, it may be inferred that adulteration of gram with wheat grain is more an accident than a necessity of the habit of mixed cultivation

CULTIVA-
TION

GRAM AS AN ARTICLE OF CATTLE DIET — In an address delivered before Gram recom-

country has always a much larger percentage of pulses in it than in Europe. The animals thrive admirably on such a diet, and the opinion may be advanced that where muscular strength is required a diet that

of oats and Indian corn. To obtain the indispensable quantity of albuminoids from an English diet the animal has to eat a greatly

scribed by Principal McCall of Glasgow, in which the tongue becomes paralysed. We be said that our and that it has tried to the extent. The writer has

CICER
arietinum.

The Common Gram

These remarks regarding anthrax have however, been made in this place mainly to prevent undue alarm, until Professor Wallace's suggestions regarding a possible connection between it and gram-feeding have been proved correct.

CHEMISTRY
1084

CHEMICAL PROPERTIES OF GRAM

Professor Church, in his *Food-Grains of India*, gives an interesting account of this pulse, but is in error in too prominently restricting the name *gram* to the forms of *Phaseolus Mungo*. This is the case only in the Madras Presidency, throughout the rest of India the terms black and green gram are practically unknown, the word gram signifying the pulse *Cicer arietinum*, although the term horse gram is sometimes applied to the pea of *Dolichos biflorus*. In Madras it might fairly well bear that name, since it takes the place of *Cicer arietinum* as a food for horses. The Professor gives a valuable table as the result "of nine analyses of the unhusked peas and of four analyses of the peas from which the husk has been removed."

"COMPOSITION OF THE CHICK-PEA.

IN 100 PARTS.

	Husked	With Husk	In 1 lb Husked	
			Oz.	Grs.
Water	11.5	11.2	1	367
Albuminoids	21.7	19.5	3	207
Starch	59.0	53.8	9	192
Oil	4.2	4.6	0	294
Fibre	1.0	2.8	0	70
Ash	2.6*	3.1†	0	182

* 1.1 of Phosphoric Acid.

† 0.8 of Phosphoric Acid

"The nutrient ratio in the unhusked peas is 1:3.3; the nutrient value is 84."

The unhusked peas are therefore more nutritious than the husked, and it may be concluded that the process of steeping them in water before

a high reputation.

TRADE.
1085

TRADE AND PRICES

Very little can be learned regarding the internal trade in gram. It is extensively eaten by the natives in every part of the country, and there must therefore exist a very considerable internal trade in the pulse. The grain could be most conveniently obtained from Bombay, Karachi, or Cal-

or Chick Pea.

CICER
arietinum.

The foreign trade is at present not very extensive. The following were the exports during the past five years:—

TRADE.

	Cwt.	Rs
1882-83	312,953	8,28,647
1883-84	392,694	11,99,796
1884-85	314,965	9,28,848
1885-86	338,129	10,74,771
1886-87	366,979	9,84,646

The exports in 1870 were only 23,171 cwt., valued at Rs4,900; but it

various Indian pulses The majority of these gentlemen agreed in

other.

Prices.—In a recent number of the publication issued by the Department of Finance and Commerce under the title of *Prices and Wages in India*, Mr. O'Connor has published tables which afford perhaps the most trustworthy data for arriving at a knowledge of the price of gram; his figures represent seers (2½) to the rupee. Mr. O'Connor's results of average prices may be thus summarised:—

PRICES.
1086

	I 1873 to '76.	II 1877 to '80.	III 1881 to '84.	IV 1885 to '80.
Madras	23 63	17'77	32'05	20 7
Bombay and Sind	17 66	11'47	18 25	14 27
Bengal	20 58	15'31	21'77	17'94
North-Western Provinces and Oudh	26 61	18 36	24'53	22 48
Panjab	30 04	18 29	26 7	24'16
Central Provinces	31'02	18 1	27'25	24 56

It would, perhaps, be unsafe to carry these figures further; but the mean of Column IV, might give the reader an average approximation of the retail price of gram in India. But it must not be lost sight of that "gram" as presently exported means more than the pea of *Cicer arietinum*, and includes (as perhaps do the above figures) pulses that have a lower value than the true gram.

CICER
arietinum

The Common Gram

PRICES

seers to the rupee in which of course a larger quantity for the same money would mean cheapness and a less quantity dearth —

DISTRICTS	August 15th	November 15th	February 15th	May 15th
Mandla	45	42	40	40
Damoh	39	27	29 8	40
Sambalpur	15	19 8	19 8	
Wardha	20	22	21	24

The difference between the prices at which the cultivators sell the produce of their fields to the dealers at harvest time and at other periods

BENGAL
1088

it is accordingly
Director of Agri
at 24 seers to the

rupee after harvest and 20 seers at other seasons taking a high exchange these quantities would represent 48 to 40lb for 1s 5d

BOMBAY
1089

Bombay—The quotation has been given in one of the *Crop Experiments* of 60 seers to the rupee or, at the rate of exchange adopted in the preceding estimates 120lb for 1s 5d It is probable however, that this figure is much too low and that the average price in the Western Presidency bears a closer approximation to that given for the Central Provinces and Bengal

PANJAB
1090

Panjab—In the Lahore district according to the *Gazetteer*, gram is stated to be sold at 100lb to the rupee (= 1s 5d) In the Mooltan district, the average price for the past 20 years is given as 60lb and in the Jhelam district for the past 44 years as from 68 to 110lb according to the

N W P
1091

am is consider

DYE
1092

s fact is known

MEDICINE
Seeds
1093

..

Gram
Vinegar
1094

or Chick Pea.

CICER
arietinum.

afterwards published in the Records of the Bombay Government (xvi) MEDICINE.

peculiar to the dew. Further on at p. 63, he observes that the natives

drug
is sold
some
given
lied as
The fresh juice of the leaves
administered with success in
The acid liquid is employed
in the treatment
and the patient
another way of

Chana-amta.

CICER
soongaricum

The Common Gram

MEDICINE
Chana-kharness' (*Brigade Surgeon J H Thornton, B A, M B, Monghyr*) "TheCHEMISTRY
1095FOOD
1096
Parched
Gram.
1097
Ragout
1098
Young plants
1099
FODDER
1100(Native 'The also in cholera (*Surgeon Major J J L Ratton, Salem*) 'It is believed to have alterative properties' (*Aligarh*)

Chemical Composition—The seeds contain, according to Balfour, moisture 10.80 per cent, fatty matter 4.56 per cent, nitrogenous matter 19.32 per cent, mineral constituent (ash) 3.12 per cent, and starchy matter 62.20 per cent. Dr Warden however, gives the following composition "One hundred parts without husk contain water 11.39, nitrogenous matters 22.7, fat 3.76, starch 63.18, and mineral matter 2.60 (*Parkes*)" (*Conf. with Church's Analysis of Pulse on a previous page*)

Food—Gram forms the chief food for horses. Amongst the poorer classes of natives parched gram (*chabena*) is much eaten. Masson informs us that in the Panjāb it is made into bread, which was a favourite article of food with the Sikh sirdārs. The natives also eat it boiled in the form of

ries instead of vinegar

The following account of gram given in the *Treasury of Botany* may be quoted here. In India the seeds form one of the pulses known under the name of 'Gram' and are greatly used as an article of food by the natives being ground into meal, and either eaten in puddings or made into cakes. They are also toasted or parched and in this state are commonly carried for food on long journeys. Rolled in sugar candy, these toasted peas form a rough sort of comfits, and gram flour made up with sesamum oil and sugar candy is an Indian sweetmeat."

Cicer Lens, Willd., see *Ervum Lens*, Linn

1101

C. soongaricum, Steph., *Fl Br Ind*, II, 176

VERN.—Tishu, jawāna banyars, sārri, serri, Pa

References—*Stewart* Pb Pl, 63, *Murray, Drugs and Pl Sind* 120, *Church Food grains of India*, p 131

Habitat—Met with in the Western Himālayas, temperate and alpine

FOOD
Seeds
1102Shoots
1103

gram is eaten by the people. The young shoots are prepared as a pickle by the Chinese, and a vinegar is made from the leaves. The latter are often covered by a viscid exudation, with a strong aromatic odour.

C. 1103

The Wild or Indian Endive.

CICHORIUM
Intybus

Atchison states that in Lahaul shoots are used as a pot-herb, and that the peas are eaten there, as they are, both raw and cooked, in parts of Ladak" (*Stewart, Pb Pl, 63, Hinderson, Mission to Yarkand*)

CICHORIUM, Linn, *Gen Pl, II, 506*

Cichorium Endivia, Linn, *Fl Br Ind, III, 391*, COMPOSITE.

THE GARDEN ENDIVE

II04

Pl, 81, DC,
'Ed, Lisboa,
of Botany
a native of
it may, there
is no doubt of its having been used as an esculent food from a very early period by the Egyptians, through whom the Greeks and Romans probably became acquainted with it (*Treasury of Botany*) The Arabs call

"Indu)

Medicine.—"Endive is much valued by the *hakims* as a resolvent and ious complaints much as taraxac-
"he four lesser cold seeds of old
East" (*Dymock*) The root is
refuge, given in 'munjus,' the
the seed is used in sherbets"

MEDICINE.

Seeds,

II05

Root

II06

Food—"Endive, radishes, and succory are mentioned by Ovid as forming part of a garden salad, and *Pliny* states that endive in his time was eaten both as a salad and pot herb. As such it has been used in

FOOD.

II07

C. Intybus, Linn, *Fl Br Ind, III, 391*, COMPOSITE

II08

THE WILD OR INDIAN ENDIVE, CHICORY, OR SUCCORY.

Vern.—Kasmi, HINDO, PERS; *Hindyba* ARAB; *Kashim-wira*, TAM, *Kasim-witulu*, TEL, *Hand gel, suchal, kasni*, PN *Kisani*, GUJ.

References—*Brandis, For Pl, 77, Kura, For Pl Burm, 77 Stewart, Pb Pl, 124 Atchison Pb Pl, 81 DC. Origin of Cult Pl, 56*

Habitat.—North-West India, Kumaon, distributed westward to the Atlantic

§ "In the plains of the Panjab it is cultivated by natives as a pot-herb (*sdg*), and may be an escape, truly wild at 4,000 to 11,000 feet" (*Surgeon-Major J. E T. Atchison, Simla*)

C. II08

CICHORIUM
Intybus

The Wild or Indian Endive.

HISTORY.

History —“The wild perennial chicory, which is cultivated as a salad, as a vegetable, as fodder, and for its roots, which are used to mix with coffee, grows throughout Europe, except in Lapland, in Morocco and Algeria, from Eastern Europe to Afghanistan and Beluchistán, in the Panjab and Kashmir, and from Russia to Lake Baikal in Siberia. The

CULTIVA-
TION
II09

fodder plant is simple enough. The seed is sown broadcast upon land that has been dug or deeply ploughed, from seven to twelve pounds per

rows. When the plants are about five inches in height, carefully hoe them and single out, leaving them about six inches apart, after the usual method in turnip culture,—that is, by boys following the hoers. Some recommend that the seed be sown in a bed, and when the plants are fit for transplanting—which will be when about five inches high—they are to be set out in rows nine inches apart, and at six-inch intervals from plant to plant in the rows. In either case, the land must be kept clean, and well

course of cropping pursued for a few years, and it may then be again sown or planted with chicory.

“In preparing the land for a root crop, deep ploughing is recom-

be carefully dug out and destroyed, when the time for taking up has arrived, because, if allowed to become mixed with the bulk, they will spoil the sample. T is been sown broadcast. he crop being easily t nine to twelve inches quan- tity used. M ants so as to leave spaces between them in the rows, each about six or eight

The of ing

is adopted’ (*Morton, Cyclop of Agri*, I, 457).

C. II09

Chicory and Coffee

CICHORIUM
Intybus.CULTIVA-
TION.

selling at 2 annas a seer. He mentions specimens of root and of seed as sent to the Lahore Exhibition from nearly every district

Great Britain imports annually close upon 200,000 cwt of the root. It is extensively grown in England, but the best roots are imported from

medicinally in the Panjab. It contains nitrate and sulphate of potash, of chicory

properties. The seeds of the seed is used is bitter and used

MEDICINE,
IIIO

(Assistant the liver
'A strong
ous vomit-
"Much
& Surgeon

Prominent in the

vegetable"
me of Barbe

FOOD
XIII

roots once constituted half the food of the poorer classes, as they probably do at the present day. "Within the last few years, grocers mixing chicory

Chicory in
Coffee.

chicory by itself. And what the English grocer requires to do is to sell pure "coffee" when he advertises - may be anything he pleases to make

ground. Roasted chicory |

C. IIII

CIMICIFUGA
foetida.

Chicory and Coffee: Black Snake Root.

FOOD.

contains a volatile empyreumatic oil, to which its aroma is due, and a bitter principle. It contains no caffeine. Infused in boiling water it yields a drink allied in flavour and colour to coffee. It is largely used in Bala. — In Germany of Germany the women are said to be regular Warden, Prof. of Chemistry,

The following extract, relating to the fact of the chicory roots being a new source of alcohol, was published in the *Tropical Agriculturist* of 1st December 1882, page 495. also p 57 —

"According to *Erfindungen und Erfahrungen*, the celebrated coffee substitute, chicory, seems likely to become of importance as a source of alcohol. The root contains an average of 24 per cent of substances easily convertible into sugar, and the alcohol obtained by its saccharification, fermentation and distillation, is characterised by a pleasant aromatic taste and great purity" (*Chemist and Druggist*).

ADULTERATIONS.
III2

Adulterations. — "Roasted chicory is extensively adulterated. To colour

dead, dog-dicuit and baked livers of horses and bullocks (1), and substances which are said to have been used for adulterating chicory. A mixture of roasted pulse (peas usually) and Venetian red has been used under the name of *Hambro' powder* for the same purpose" (*Ure's Diet, Art and Manuf*). A recent examination of certain "coffee mixtures" revealed the fact that roasted cockroaches and iron rust were employed as adulterants. (*See Coffea arabica, para Adulterants*)

CIMICIFUGA, Linn; Gen Pl, I, 9.

III3

Cimicifuga foetida, Linn.; *Fl Br Ind.*, I, 30, RANUNCULACEÆ.

Vern — *Jiunth*, Pb

References. — *Stewart*, Pb Pl, 2, *Treasury of Botany*, *New Official Guide to the Museum*, 8

Habitat. — Found in the temperate Himálaya, from Bhután to Kashmir, altitude 7,000 to 12,000 feet.

MEDICINE.
Root.
III4

Medicine. — The root is said to be poisonous. In Siberia it is used to drive away bugs and fleas. Under the name of a nearly allied plant (*Actæa spicata*), the writer has already referred to this plant, and chiefly with the view of attracting attention to these useful but apparently neglected plants.

Garrod, in his *Materia Medica*, calls *Cimicifuga racemosa*, Linn., the

made known to Europe in 1690, and was scientifically described as a

Black Snake Root: Cinchona Bark.

CINCHONA.

cial virtues. *C. racemosa* is chiefly prescribed in the form of tincture, and employed in rheu-
and chronic bronchial
been used to reduce
A section of the root

MEDICINE.

shaped sections, with a thick brittle
contains a resinous active principle
Macroton In its action this drug
and colchicum on the other. It is
most useful in acute rheumatism, and a powder of the root is perhaps the
best mode in which to give the drug, in doses of 20 to 30 grains (Royle's
Mat Med. ed. by Harley)

Special Opinion — § "A poultice prepared of the fresh leaves is used
here, and said to be very useful in rheumatic affection of joints" (*Surgeon*
C. F. W. Meidous, Burrisal)

CINCHONA, Linn, Gen Pl, II, 32

III5

Cinchona, Linn, RUBIACEÆ.

CINCHONA BARK, PERUVIAN BARK, JESUIT'S BARK, COUNTESS'S
BARK, ECORCE DE QUINQUINA, Fr, CHINARINDE, Germ.

References — U. S. Disp., 1847, 1850, 1852, 1854, 1856, 1858, 1860, 1862, 1864, 1866, 1868, 1870, 1872, 1874, 1876, 1878, 1880, 1882, 1884, 1886, 1888, 1890, 1892, 1894, 1896, 1898, 1900, 1902, 1904, 1906, 1908, 1910, 1912, 1914, 1916, 1918, 1920, 1922, 1924, 1926, 1928, 1930, 1932, 1934, 1936, 1938, 1940, 1942, 1944, 1946, 1948, 1950, 1952, 1954, 1956, 1958, 1960, 1962, 1964, 1966, 1968, 1970, 1972, 1974, 1976, 1978, 1980, 1982, 1984, 1986, 1988, 1990, 1992, 1994, 1996, 1998, 2000, 2002, 2004, 2006, 2008, 2010, 2012, 2014, 2016, 2018, 2020, 2022, 2024, 2026, 2028, 2030, 2032, 2034, 2036, 2038, 2040, 2042, 2044, 2046, 2048, 2050, 2052, 2054, 2056, 2058, 2060, 2062, 2064, 2066, 2068, 2070, 2072, 2074, 2076, 2078, 2080, 2082, 2084, 2086, 2088, 2090, 2092, 2094, 2096, 2098, 2100, 2102, 2104, 2106, 2108, 2110, 2112, 2114, 2116, 2118, 2120, 2122, 2124, 2126, 2128, 2130, 2132, 2134, 2136, 2138, 2140, 2142, 2144, 2146, 2148, 2150, 2152, 2154, 2156, 2158, 2160, 2162, 2164, 2166, 2168, 2170, 2172, 2174, 2176, 2178, 2180, 2182, 2184, 2186, 2188, 2190, 2192, 2194, 2196, 2198, 2200, 2202, 2204, 2206, 2208, 2210, 2212, 2214, 2216, 2218, 2220, 2222, 2224, 2226, 2228, 2230, 2232, 2234, 2236, 2238, 2240, 2242, 2244, 2246, 2248, 2250, 2252, 2254, 2256, 2258, 2260, 2262, 2264, 2266, 2268, 2270, 2272, 2274, 2276, 2278, 2280, 2282, 2284, 2286, 2288, 2290, 2292, 2294, 2296, 2298, 2300, 2302, 2304, 2306, 2308, 2310, 2312, 2314, 2316, 2318, 2320, 2322, 2324, 2326, 2328, 2330, 2332, 2334, 2336, 2338, 2340, 2342, 2344, 2346, 2348, 2350, 2352, 2354, 2356, 2358, 2360, 2362, 2364, 2366, 2368, 2370, 2372, 2374, 2376, 2378, 2380, 2382, 2384, 2386, 2388, 2390, 2392, 2394, 2396, 2398, 2400, 2402, 2404, 2406, 2408, 2410, 2412, 2414, 2416, 2418, 2420, 2422, 2424, 2426, 2428, 2430, 2432, 2434, 2436, 2438, 2440, 2442, 2444, 2446, 2448, 2450, 2452, 2454, 2456, 2458, 2460, 2462, 2464, 2466, 2468, 2470, 2472, 2474, 2476, 2478, 2480, 2482, 2484, 2486, 2488, 2490, 2492, 2494, 2496, 2498, 2500, 2502, 2504, 2506, 2508, 2510, 2512, 2514, 2516, 2518, 2520, 2522, 2524, 2526, 2528, 2530, 2532, 2534, 2536, 2538, 2540, 2542, 2544, 2546, 2548, 2550, 2552, 2554, 2556, 2558, 2560, 2562, 2564, 2566, 2568, 2570, 2572, 2574, 2576, 2578, 2580, 2582, 2584, 2586, 2588, 2590, 2592, 2594, 2596, 2598, 2600, 2602, 2604, 2606, 2608, 2610, 2612, 2614, 2616, 2618, 2620, 2622, 2624, 2626, 2628, 2630, 2632, 2634, 2636, 2638, 2640, 2642, 2644, 2646, 2648, 2650, 2652, 2654, 2656, 2658, 2660, 2662, 2664, 2666, 2668, 2670, 2672, 2674, 2676, 2678, 2680, 2682, 2684, 2686, 2688, 2690, 2692, 2694, 2696, 2698, 2700, 2702, 2704, 2706, 2708, 2710, 2712, 2714, 2716, 2718, 2720, 2722, 2724, 2726, 2728, 2730, 2732, 2734, 2736, 2738, 2740, 2742, 2744, 2746, 2748, 2750, 2752, 2754, 2756, 2758, 2760, 2762, 2764, 2766, 2768, 2770, 2772, 2774, 2776, 2778, 2780, 2782, 2784, 2786, 2788, 2790, 2792, 2794, 2796, 2798, 2800, 2802, 2804, 2806, 2808, 2810, 2812, 2814, 2816, 2818, 2820, 2822, 2824, 2826, 2828, 2830, 2832, 2834, 2836, 2838, 2840, 2842, 2844, 2846, 2848, 2850, 2852, 2854, 2856, 2858, 2860, 2862, 2864, 2866, 2868, 2870, 2872, 2874, 2876, 2878, 2880, 2882, 2884, 2886, 2888, 2890, 2892, 2894, 2896, 2898, 2900, 2902, 2904, 2906, 2908, 2910, 2912, 2914, 2916, 2918, 2920, 2922, 2924, 2926, 2928, 2930, 2932, 2934, 2936, 2938, 2940, 2942, 2944, 2946, 2948, 2950, 2952, 2954, 2956, 2958, 2960, 2962, 2964, 2966, 2968, 2970, 2972, 2974, 2976, 2978, 2980, 2982, 2984, 2986, 2988, 2990, 2992, 2994, 2996, 2998, 3000, 3002, 3004, 3006, 3008, 3010, 3012, 3014, 3016, 3018, 3020, 3022, 3024, 3026, 3028, 3030, 3032, 3034, 3036, 3038, 3040, 3042, 3044, 3046, 3048, 3050, 3052, 3054, 3056, 3058, 3060, 3062, 3064, 3066, 3068, 3070, 3072, 3074, 3076, 3078, 3080, 3082, 3084, 3086, 3088, 3090, 3092, 3094, 3096, 3098, 3100, 3102, 3104, 3106, 3108, 3110, 3112, 3114, 3116, 3118, 3120, 3122, 3124, 3126, 3128, 3130, 3132, 3134, 3136, 3138, 3140, 3142, 3144, 3146, 3148, 3150, 3152, 3154, 3156, 3158, 3160, 3162, 3164, 3166, 3168, 3170, 3172, 3174, 3176, 3178, 3180, 3182, 3184, 3186, 3188, 3190, 3192, 3194, 3196, 3198, 3200, 3202, 3204, 3206, 3208, 3210, 3212, 3214, 3216, 3218, 3220, 3222, 3224, 3226, 3228, 3230, 3232, 3234, 3236, 3238, 3240, 3242, 3244, 3246, 3248, 3250, 3252, 3254, 3256, 3258, 3260, 3262, 3264, 3266, 3268, 3270, 3272, 3274, 3276, 3278, 3280, 3282, 3284, 3286, 3288, 3290, 3292, 3294, 3296, 3298, 3300, 3302, 3304, 3306, 3308, 3310, 3312, 3314, 3316, 3318, 3320, 3322, 3324, 3326, 3328, 3330, 3332, 3334, 3336, 3338, 3340, 3342, 3344, 3346, 3348, 3350, 3352, 3354, 3356, 3358, 3360, 3362, 3364, 3366, 3368, 3370, 3372, 3374, 3376, 3378, 3380, 3382, 3384, 3386, 3388, 3390, 3392, 3394, 3396, 3398, 3400, 3402, 3404, 3406, 3408, 3410, 3412, 3414, 3416, 3418, 3420, 3422, 3424, 3426, 3428, 3430, 3432, 3434, 3436, 3438, 3440, 3442, 3444, 3446, 3448, 3450, 3452, 3454, 3456, 3458, 3460, 3462, 3464, 3466, 3468, 3470, 3472, 3474, 3476, 3478, 3480, 3482, 3484, 3486, 3488, 3490, 3492, 3494, 3496, 3498, 3500, 3502, 3504, 3506, 3508, 3510, 3512, 3514, 3516, 3518, 3520, 3522, 3524, 3526, 3528, 3530, 3532, 3534, 3536, 3538, 3540, 3542, 3544, 3546, 3548, 3550, 3552, 3554, 3556, 3558, 3560, 3562, 3564, 3566, 3568, 3570, 3572, 3574, 3576, 3578, 3580, 3582, 3584, 3586, 3588, 3590, 3592, 3594, 3596, 3598, 3600, 3602, 3604, 3606, 3608, 3610, 3612, 3614, 3616, 3618, 3620, 3622, 3624, 3626, 3628, 3630, 3632, 3634, 3636, 3638, 3640, 3642, 3644, 3646, 3648, 3650, 3652, 3654, 3656, 3658, 3660, 3662, 3664, 3666, 3668, 3670, 3672, 3674, 3676, 3678, 3680, 3682, 3684, 3686, 3688, 3690, 3692, 3694, 3696, 3698, 3700, 3702, 3704, 3706, 3708, 3710, 3712, 3714, 3716, 3718, 3720, 3722, 3724, 3726, 3728, 3730, 3732, 3734, 3736, 3738, 3740, 3742, 3744, 3746, 3748, 3750, 3752, 3754, 3756, 3758, 3760, 3762, 3764, 3766, 3768, 3770, 3772, 3774, 3776, 3778, 3780, 3782, 3784, 3786, 3788, 3790, 3792, 3794, 3796, 3798, 3800, 3802, 3804, 3806, 3808, 3810, 3812, 3814, 3816, 3818, 3820, 3822, 3824, 3826, 3828, 3830, 3832, 3834, 3836, 3838, 3840, 3842, 3844, 3846, 3848, 3850, 3852, 3854, 3856, 3858, 3860, 3862, 3864, 3866, 3868, 3870, 3872, 3874, 3876, 3878, 3880, 3882, 3884, 3886, 3888, 3890, 3892, 3894, 3896, 3898, 3900, 3902, 3904, 3906, 3908, 3910, 3912, 3914, 3916, 3918, 3920, 3922, 3924, 3926, 3928, 3930, 3932, 3934, 3936, 3938, 3940, 3942, 3944, 3946, 3948, 3950, 3952, 3954, 3956, 3958, 3960, 3962, 3964, 3966, 3968, 3970, 3972, 3974, 3976, 3978, 3980, 3982, 3984, 3986, 3988, 3990, 3992, 3994, 3996, 3998, 4000, 4002, 4004, 4006, 4008, 4010, 4012, 4014, 4016, 4018, 4020, 4022, 4024, 4026, 4028, 4030, 4032, 4034, 4036, 4038, 4040, 4042, 4044, 4046, 4048, 4050, 4052, 4054, 4056, 4058, 4060, 4062, 4064, 4066, 4068, 4070, 4072, 4074, 4076, 4078, 4080, 4082, 4084, 4086, 4088, 4090, 4092, 4094, 4096, 4098, 4100, 4102, 4104, 4106, 4108, 4110, 4112, 4114, 4116, 4118, 4120, 4122, 4124, 4126, 4128, 4130, 4132, 4134, 4136, 4138, 4140, 4142, 4144, 4146, 4148, 4150, 4152, 4154, 4156, 4158, 4160, 4162, 4164, 4166, 4168, 4170, 4172, 4174, 4176, 4178, 4180, 4182, 4184, 4186, 4188, 4190, 4192, 4194, 4196, 4198, 4200, 4202, 4204, 4206, 4208, 4210, 4212, 4214, 4216, 4218, 4220, 4222, 4224, 4226, 4228, 4230, 4232, 4234, 4236, 4238, 4240, 4242, 4244, 4246, 4248, 4250, 4252, 4254, 4256, 4258, 4260, 4262, 4264, 4266, 4268, 4270, 4272, 4274, 4276, 4278, 4280, 4282, 4284, 4286, 4288, 4290, 4292, 4294, 4296, 4298, 4300, 4302, 4304, 4306, 4308, 4310, 4312, 4314, 4316, 4318, 4320, 4322, 4324, 4326, 4328, 4330, 4332, 4334, 4336, 4338, 4340, 4342, 4344, 4346, 4348, 4350, 4352, 4354, 4356, 4358, 4360, 4362, 4364, 4366, 4368, 4370, 4372, 4374, 4376, 4378, 4380, 4382, 4384, 4386, 4388, 4390, 4392, 4394, 4396, 4398, 4400, 4402, 4404, 4406, 4408, 4410, 4412, 4414, 4416, 4418, 4420, 4422, 4424, 4426, 4428, 4430, 4432, 4434, 4436, 4438, 4440, 4442, 4444, 4446, 4448, 4450, 4452, 4454, 4456, 4458, 4460, 4462, 4464, 4466, 4468, 4470, 4472, 4474, 4476, 4478, 4480, 4482, 4484, 4486, 4488, 4490, 4492, 4494, 4496, 4498, 4500, 4502, 4504, 4506, 4508, 4510, 4512, 4514, 4516, 4518, 4520, 4522, 4524, 4526, 4528, 4530, 4532, 4534, 4536, 4538, 4540, 4542, 4544, 4546, 4548, 4550, 4552, 4554, 4556, 4558, 4560, 4562, 4564, 4566, 4568, 4570, 4572, 4574, 4576, 4578, 4580, 4582, 4584, 4586, 4588, 4590, 4592, 4594, 4596, 4598, 4600, 4602, 4604, 4606, 4608, 4610, 4612, 4614, 4616, 4618, 4620, 4622, 4624, 4626, 4628, 4630, 4632, 4634, 4636, 4638, 4640, 4642, 4644, 4646, 4648, 4650, 4652, 4654, 4656, 4658, 4660, 4662, 4664, 4666, 4668, 4670, 4672, 4674, 4676, 4678, 4680, 4682, 4684, 4686, 4688, 4690, 4692, 4694, 4696, 4698, 4700, 4702, 4704, 4706, 4708, 4710, 4712, 4714, 4716, 4718, 4720, 4722, 4724, 4726, 4728, 4730, 4732, 4734, 4736, 4738, 4740, 4742, 4744, 4746, 4748, 4750, 4752, 4754, 4756, 4758, 4760, 4762, 4764, 4766, 4768, 4770, 4772, 4774, 4776, 4778, 4780, 4782, 4784, 4786, 4788, 4790, 4792, 4794, 4796, 4798, 4800, 4802, 4804, 4806, 4808, 4810, 4812, 4814, 4816, 4818, 4820, 4822, 4824, 4826, 4828, 4830, 4832, 4834, 4836, 4838, 4840, 4842, 4844, 4846, 4848, 4850, 4852, 4854, 4856, 4858, 4860, 4862, 4864, 4866, 4868, 4870, 4872, 4874, 4876, 4878, 4880, 4882, 4884, 4886, 4888, 4890, 4892, 4894, 4896, 4898, 4900, 4902, 4904, 4906, 4908, 4910, 4912, 4914, 4916, 4918, 4920, 4922, 4924, 4926, 4928, 4930, 4932, 4934, 4936, 4938, 4940, 4942, 4944, 4946, 4948, 4950, 4952, 4954, 4956, 4958, 4960, 4962, 4964, 4966, 4968, 4970, 4972, 4974, 4976, 4978, 4980, 4982, 4984, 4986, 4988, 4990, 4992, 4994, 4996, 4998, 5000, 5002, 5004, 5006, 5008, 5010, 5012, 5014, 5016, 5018, 5020, 5022, 5024, 5026, 5028, 5030, 5032, 5034, 5036, 5038, 5040, 5042, 5044, 5046, 5048, 5050, 5052, 5054, 5056, 5058, 5060, 5062, 5064, 5066, 5068, 5070, 5072, 5074, 5076, 5078, 5080, 5082, 5084, 5086, 5088, 5090, 5092, 5094, 5096, 5098, 5100, 5102, 5104, 5106, 5108, 5110, 5112, 5114, 5116, 5118, 5120, 5122, 5124, 5126, 5128, 5130, 5132, 5134, 5136, 5138, 5140, 5142, 5144, 5146, 5148, 5150, 5152, 5154, 5156, 5158, 5160, 5162, 5164, 5166, 5168, 5170, 5172, 5174, 5176, 5178, 5180, 5182, 5184, 5186, 5188, 5190, 5192, 5194, 5196, 5198, 5200, 5202, 5204, 5206, 5208, 5210, 5212, 5214, 5216, 5218, 5220, 5222, 5224, 5226, 5228, 5230, 5232, 5234, 5236, 5238, 5240, 5242, 5244, 5246, 5248, 5250, 5252, 5254, 5256, 5258, 5260, 5262, 5264, 5266, 5268, 5270, 5272, 5274, 5276, 5278, 5280, 5282, 5284, 5286, 5288, 5290, 5292, 5294, 5296, 5298, 5300, 5302, 5304, 5306, 5308, 5310, 5312, 5314, 5316, 5318, 5320, 5322, 5324, 5326, 5328, 5330, 5332, 5334, 5336, 5338, 5340, 5342, 5344, 5346, 5348, 5350, 5352, 5354, 5356, 5358, 5360, 5362, 5364, 5366, 5368, 5370, 5372, 5374, 5376, 5378, 5380, 5382, 5384, 5386, 5388, 5390, 5392, 5394, 5396, 5398, 5400, 5402, 5404, 5406, 5408, 5410, 5412, 5414, 5416, 5418, 5420, 5422, 5424, 5426, 5428, 5430, 5432, 5434, 5436, 5438, 5440, 5442, 5444, 5446, 5448, 5450, 5452, 5454, 5456, 5458, 5460, 5462, 5464, 5466, 5468, 5470, 5472, 5474, 5476, 5478, 5480, 5482, 5484, 5486, 5488, 5490, 5492, 5494, 5496, 5498, 5500, 5502, 5504, 5506, 5508, 5510, 5512, 5514, 5516, 5518, 5520, 5522, 5524, 5526, 5528, 5530, 5532, 5534, 5536, 5538, 5540, 5542, 5544, 5546, 5548, 5550, 5552, 5554, 5556, 5558, 5560, 5562, 5564, 5566, 5568, 5570, 5572, 5574, 5576, 5578, 5580, 5582, 5584, 5586, 5588, 5590, 5592, 5594, 5596, 5598, 5600, 5602, 5604, 5606, 5608, 5610, 5612, 5614, 5616, 5618, 5620, 5622, 5624, 5626, 5628, 5630, 5632, 5634, 5636, 5638, 5640, 5642, 5644, 5646, 5648, 5650, 5652, 5654, 5656, 5658, 5660, 5662, 5664, 5666, 5668, 5670, 5672, 5674, 5676, 5678, 5680, 5682, 5684, 5686, 5688, 5690, 5692, 5694, 5696, 5698, 5700, 5702, 5704, 5706, 5708, 5710, 5712, 5714, 5716, 5718, 5720, 5722, 5724, 5726, 5728, 5730, 5

CINCHONA.

Cinchona Bark.

compiling the present article, but has at the same time verified the historic and other facts by consulting the works enumerated above.

Habitat.—Dr. King says: "The trees producing the medicinal barks are all natives of tropical South America, where they are found in the dense forests of the mountainous regions of the western parts of that continent at a height of from 2,500 to 9,000 feet above the level of the sea, and in an equable but comparatively cool climate. The Cinchona-producing region forms a crescentic zone which follows the contour of the coast line, but nowhere actually to the coast, being at least 20° N. and extending to 20° S. latitude, a hundred miles in width, but than two thousand. During its of Venezuela, New Granada, &c."

the zone in 20° S. were described by M. Weddell in his splendid monograph published at Paris in 1849."

HISTORY.

HISTORY OF THE INTRODUCTION OF THE DRUG INTO EUROPE.

"The introduction of the medicinal Cinchona bark to Europe was the work of a Spanish Viceroy of Peru, who, after recovering from an attack of fever contracted in the mountains of the Cordillera, brought the bark to Europe in the year 1639. Jesuit missionaries were also to be taken as active part in its introduction. Hence the bark is sometimes called *Jesuit's bark*, and the name of the tree is *Cinchona*. Jussieu, member of the Académie des Sciences, obtained the first living Cinchona in 1739, near the mouth of the River Amazon. The first living Cinchona ever

introduced this invaluable remedy to Europe (King).

HISTORY OF THE ALKALOIDS.—"The most important and at the same time peculiar constituents of Cinchona barks are the alkaloids

C. 1116

History of the Alkaloids.

CINCHONA.

enumerated in the following table:—

Alkaloid	Chemical composition	HISTORY OF THE ALKALOIDS.
Cinchonine	$C_{20}H_{24}N_2O$	
Cinchonidine (quinidine of many writers)	Same formula.	
Quinine	$C_{20}H_{24}N_2O_2$	
Quinidine (conquinine of Hesse)	Same formula	
Quinamine	$C_{20}H_{26}N_2O_2$	
so fr		
febr		
cert.		
alka		

the outward appearance of these being alike. With the separation of the new alkaloids, chemical tests for their recognition began to be inserted in

bark still continues to be rated by the European quinine-makers in proportion to the per centage of quinine it contains, the other alkaloids being

devoid of quinine, while those of the same species from a neighbouring

down to less than 1 per cent.

"Among"
are a great n
principles, of
altogether w

CINCHONA.

History of its Introduction into India.

HISTORY
OF THE
ALKALOIDS.

observed, was obtained by Broughton from a bark grown at Ootacamund. This bark afforded not less than 13½ per cent. of alkaloids, among which quinine was predominant.

"The few facts just mentioned show that it is impossible to state even

quinine

"As to *Crown* or *Loxa* bark, the *Cortex Cinchonæ palidæ* of pharmacy, its merits are, to say the least, very uncertain. On its first introduction in the seventeenth century, when it was taken from the trunks and large branches of full-grown trees, it was doubtless an excellent medicinal bark; but the same cannot be said of much of that now found in commerce, which is to a large extent collected from very young wood. Some of the Crown Bark produced in India is, however, of extraordinary excellency, as shown by the recent experiments of DeVry.

"As to red bark, the thick flat sort contains only three to four per cent. of alkaloids, but a large amount of colouring matter. The quill Red Bark of the Indian plantations is a much better drug, some of it yielding 5 to 10 per cent. of alkaloids, less than a third of which is quinine and a fourth cinchonidine, the remainder being cinchonine and sometimes also traces of quinidine (conquinine).

"The variation in the amount of alkaloids relates not merely to their total percentage, but also to the proportion which one bears to another. Quinine and cinchonine are of the most frequent occurrence; cinchonidine is less usual, while quinidine is still less frequently met with, and never in large amount. The experiments performed in India have

HISTORY OF THE INTRODUCTION OF CINCHONA INTO INDIA.

Dr. King writes "The practice of the bark collectors in the wild regions in which Cinchonas naturally grow involved the destruction of each tree felled for its bark, yet no measures were ever taken by the owners of either public or private forests to secure supplies for the future by conservancy or re-planting. Meanwhile the consumption of bark in Europe steadily increased, and, as a natural result, prices rose, and fears began to be entertained that the supply would ultimately fail. The British and Dutch Governments being, by reason of their tropical possessions, the

INTRODUC-
TION INTO
INDIA.

History of its Introduction into India.

CINCHONA.

the preservation of the natural forests, that great fears have been entertained that the supply might altogether cease, or be obtainable only at a price which would place it beyond the reach of the mass of the community."

HISTORY
OF THE
INTRODUCTION
INTO
INDIA.

"Dr. Royle's recommendations, although approved of, were not at the time acted upon, but were allowed to remain in abeyance until 1859, when the increasing and constantly increasing destruction of Government forests seemed almost certain to result in the complete destruction of the Cinchona forests of the Himalayas."

Garden, recommended that an intelligent and qualified gardening collector should be deputed for a couple of years to the mountains of South America for the purpose of exploring the Cinchona forests, and of procuring seeds and cuttings of the various species."

the matter, as also did the late Dr. J. Anderson, the Medical Board."

to be found
bark forests.
Spruce and
the eastern
Markham
which he had

the inhabitants and flora of regions he traversed. Landing at Islay in March 1860, Mr. Markham, accompanied by Mr. Weir (a practical

History of its Introduction into India.

CINCHONA.

two months later. In the month of December 1861, Dr Anderson delivered over to Mr. Melver at Ootacamund the plants he had brought from the Cinchona plantation which the Dutch had just succeeded in establishing in Java. Dr. Anderson had been sent by the Government of India by the courtesy of the Dutch authorities he had 50 plants of Cinchona Callisaya, four of Pahudiana. On the 4th March or crown bark seeds from Loxa archona to India became thus an accomplished fact" (King).

Introduction into South India.—"The success of Cinchona succirubra and officinalis on the Nilgiris has been remarkable. Not only do the trees grow luxuriantly, but their bark is richer in alkaloids than much of the Cinchona bark imported from South America. The Government plantations there, according to the returns for 1884-85, contain 1,618,744 trees of sorts. The Nilgiri plantations were under the superintendence of Mr. Melver until his death, since which they have been under Mr. M. A. Lawson.

"Encouraged by its success on the Nilgiris, Cinchona cultivation was warmly taken up by European residents in the other high lands and hill ranges of the Madras Presidency. The coffee planters of Wynad put out a good many red bark trees on their estates, and these are found to grow well. In South Canara a small plantation was formed in 1869, at a place called Nagooli, above the Kolor Ghât, and at an elevation of 2,500 feet above the sea, but the experiment there was pronounced by the Madras Government as unlikely to be productive of useful results, and was abandoned. On the Mahendra Mountain, in the Ganjam district, the Madras Government the Forest Department the Nulla Mully barks), and, as the experiment was, however, and the Cinchona was taken up to a greater or less extent, both by private planters and the Government" (King).

HISTORY
OF THE
INTRODUCTION INTO
INDIA

South India.

most probably thrive best. For the hardier kinds Mr. Markham

CINCHONA

History of its Introduction into India

HISTORY
OF THE
INTRODUC-
TION INTO
INDIA

this case is the result of the patience and intelligence which Mr McIver

tions Of these the following are the more important :—

- | | |
|-----------------------------------|---------------------------------------|
| (1) <i>C. officinalis.</i> | (8) <i>C. verde</i> (com form). |
| (2) <i>C. succirubra.</i> | (9) <i>C. zamba morada</i> (com form) |
| (3) <i>C. Calisaya.</i> | (10) <i>C. carthagena</i> (com form) |
| (4) <i>C. Ledgeriana.</i> | (11) <i>C. Pahudiana</i> |
| (5) <i>C. javanica.</i> | (12) <i>C. Humboldtiana.</i> |
| (6) <i>C. Santa Fe</i> (com form) | (13) <i>C. Pitayensis.</i> |
| (7) <i>C. morada</i> (com form) | (14) <i>C. micrantha.</i> |

He adds "Of these, the only kinds which are largely grown in the Govern-

Bengal

Sikkim plantation has been under the charge of Dr Anderson's suc-
cessors, viz, Mr O B Clarke, during 1870 and 1871, and Dr George
King, since the latter date Since 1866, the Sikkim plantations have

Calcutta from Ootacamund 193 plants of *succirubra* and of the species
yielding grey bark Some of the Java plants died in Calcutta, and on the
19th January 1862 the total stock in the Botanical Gardens there from

him,
the
have

History of its Introduction into India

CINCHONA.

been largely increased, and at 31st March 1885 their contents were as follows —

	Red (Cinchona succubra)	Yellow (Cinchona Calisaya and Ledgeriana)	Yellow (Cinchona Calisaya verde and morada)	Hybrid (unnamed variety)	Other kinds	Total of all sorts
Mungpoo Division	2,132,000	801,118	134,300	345,100	25,593	3,438,111
Sitong " "	1,100,000	70,000	15,000	40,000	...	1,225,000
Rungjung " "		2,15,000	34,000			249,000
GRAND TOTAL OF ALL KINDS	3,232,000	1,076,118	183,300	385,100	25,593	4,912,111

HISTORY OF THE INTRODUCTION INTO INDIA.

"A Cinchona plantation was begun by a private company in Sikkim almost simultaneously with that belonging to Government, and more recently a second such plantation has been opened out in Bhotan. Patches of Cinchona were also planted in several tea gardens in the

Khasia hills.

"*Into North-Western Provinces* — The cultivation also received a very patient trial for several years in the North-Western Provinces of India, and plantations were begun at various altitudes from 2,000 to 6,500 feet above the sea, but the plants all ultimately perished from frost. A similar result followed the spirited attempt of Colonel Nassau Lees to grow

N.-W. Provinces.

Bombay.

Burma.

north of Toungoo, and about 54,000 plants are now alive. But the plantation does not thrive so well as could be wished, and it is desirable that the advice of an expert should be obtained as to the best course to be taken. It was hoped that Dr King would have visited Burma, but as yet he has been unable to do so. If the Government of Bengal can spare him, perhaps he will be able to come in May 1883. At Poonchoung the cultivation of Cinchona has done so poorly that orders have been given to abandon further outlay on the experiment there. About 300 lb of Cinchona bark were recently received from Thandoung, and

ultivation of Cinchona
otamst, Dr Thwaites,
It was subsequently

Ceylon.

CINCHONA
Calisaya,

The Yellow Bark of Commerce.

HISTORY
OF THE
INTRODUC-
TION INTO
INDIA.

taken up with great vigour by the very spirited planting community of that then most flourishing colony, and to such an extent was the cultivation carried, that in the year 1881 no less than three millions of pounds of dry Cinchona bark were exported from that island to England, and in subsequent years the exports have materially increased" (King) During the years 1885-86-87, Dr King informs the writer the annual exports from Ceylon touched 15 million pounds

THE SPECIES OF CINCHONA.

There are between 20 and 30 species of Cinchona.

will be necessary only to allude to the better known species and varieties which are cultivated in India

1117

Cinchona Calisaya, Weddell, RUBIACEÆ

THE CALISAYA BARK OF YELLOW BARK OF COMMERCE, a term also applied to the bark of C LEDGERIANA

Vern — *Burak*, DEC, *Shurappattai*, TAM, *Yradap-patta* TEL

References — *Kew Reports*, 1877, pp 14, 28 1879, pp 12, 13 1880, pp 11, 25, 32, 1881, 25, 1882, pp 18, 19, 38; *Trop Agriculturist*, 1883, 704

most only second to C *succubra* in point of importance in the Sikkim plantations. In a Resolution of the Bengal Government dated March 1888, it is stated that Mr Wood was of opinion that good quinine barks could be procured in Sikkim. "On the other hand, the attempt to cultivate this species in the Nilgiri hills has been practically abandoned. *Calisaya* was discovered by M Weddell in 1847, it is a native of Bolivia and South Peru. The supply of bark from natural

tion was not acted upon for some time. Full effect has, however, been given to it of recent years, and *succubra* has been supplanted by *Calisaya* to the extent of about a million trees." On the other hand, the attempt to cultivate this species in the Nilgiri hills has been practically abandoned. *Calisaya* was discovered by M Weddell in 1847, it is a native of Bolivia and South Peru. The supply of bark from natural

MEDICINE

Bark

1118

Powder

1119

Leaves

1120

C. 1120

The Ledgeriana Bark of Commerce

CINCHONA
Ledgeriana

uncoated, consisting almost entirely of liber, is $\frac{1}{4}$ to $\frac{1}{2}$ inch thick Its MEDICINE.

Flava of the Pharmacopœia

Structure of the Wood — Reddish-grey, moderately hard, even-grained
Pores small, in short radial lines Medullary rays fine, closely packed

VARIETIES OF C CALISAYA

Numerous varieties and hybrids have been distinguished of this species, especially by Weddell. The best known are *var* Josephiana (named after Josephiana, but C zamba, are being experimentally
ills Dr. Van Gorkum, the
in 1873. "Our plantation

"The outward of know
manner of harvesting, drying, and packing, but certain it is that their treatment is highly spoken of." "There are numerous varieties of C. Calisaya, but we possess one with which we have become acquainted,

TIMBER.
II21

Josephiana.
II22
Zamba
II23
Morada
II24
Verde.
II25
Blanca.
II26

Cinchona Ledgeriana (a cultivated form)

II27

Cinchonas, and consequently the amount of bark harvested in a given number of years is much smaller than that taken from other kinds. The bark also, when it is renewed, is less rich in quinine than the natural bark, so that the trees, instead of having their bark improved by the process of

C. II27

CINCHONA
officinalis.**LOXA or Crown Bark of Commerce.**

stripping, as is the case in the other kinds of *Cinchona*, decrease in value. These two circumstances make it doubtful if plantations of *C. Ledgeriana* will, in the long run, be much more profitable to the planter than those formed of the more hardy and earlier bearing *C. calisaya*.

was certain to prove more remunerative than that of any other species. It could be propagated at lower altitudes than the others (scarcely growing above 4,000 feet), and was, from this point alone, a more economical plant. In *Shi-mo C. Ledgeriana* was found to be a more profitable tree.

"To-
veller,
near
s and

proved by far the most productive in quinine of all *Cinchona* barks. The tree is a mere form of *C. calisaya*. Mr. Hooper, Quinologist to the Madras Government, in a recent report, remarks: "In the *Ledger bark* it will be noticed that there is a steady rise of quinine up to the age of between five and six years, after which there is no apparent increase."

1128

***Cinchona carthagena* (Commercial name)**

This has been successfully introduced into the Nilgiri hills within the past few years, and Mr. Lawson alludes to it in his reports. In 1881-82 he says that up to date "the propagation of this valuable *Cinchona* was carried on with most satisfactory results." Again, in 1882-83, the plants "continue to make a very satisfactory growth."

1129

C. officinalis*, Hook.*LOXA or CROWN BARK; the Pale Bark of Commerce****Syn.—C. CONDAMINES, Humb.****References.—Year Book of Pharm., 1873, 447, 1875, 161, 1878, 444**

"*C. calisaya* is the most productive and the most hardy of the *Cinchona* trees, and is the most valuable for the production of quinine."

MEDICINE.
LOXA BARK.
1130
TIMBER.
1131

of *C. calisaya*.

At the present day it is scarcely possible to obtain *Loxa* or *Crown bark* from South America; India, Ceylon, and Jamaica being the chief sources of the bark in commerce.

C. 1131

Red Bark of Commerce

CINCHONA
succirubra.

to 1 per cent.
5 per cent,
honidine and

CINCHONINE

Cinchona succirubra, Paron

RED BARK

References — *Year Book of Pharm.*, 1873, 70—73, 447, 1874, 19—20, 150—154, 1875, 12, 159, *New Report*, 1877, 28

Habitat — Cultivated on the Nilgiris and other hills of South India, at the plantations of Rangbi and Poomong in Sikkim, on the hills east of Toungoo, in Burma, and in parts of the Satpura Range in Central India

Mr. Lawson writes of South India, while speaking of *C. officinalis*: "The *C. succirubra*, on the other hand, has a bold sturdy stem, which in rich soil and sheltered situations, grows to the height of 50 feet or more. The leaves are a bright apple-green in colour, and a plantation made up of this species looks as light and bright, as that of the *C. officinalis* looks dark and gloomy."

The red *C. succirubra* and the *C. officinalis* have the same general appearance.

Medicine — This species thrives at a lower elevation than the others, but is comparatively poor in quinine, though rich in cinchonine and cinchonidine. It yields its best bark when eight years old. From it is chiefly derived the "Cinchona Febrifuge," which is now largely manufactured at the Government Plantation of Rangbi. Mr. W. Elborne remarks (*Pharm. Soc. Jour.*) "The experiments of Mr. J. E. Howard and others have proved that the bark of the root contains a larger proportion of alkaloids than that of the stem, and that the proportion of alkaloid diminishes upwards to the branches." Mr. David Howard has also shewn that the nature of the alkaloid varies according to the part of the tree from which the bark has been taken.

In the opinion of pharmacists the bark most suitable for medicinal use is the *Cinchona succirubra*. The cause of this preference, as pointed out by Mr. Holmes, are the following: (1) the red bark supply will probably be always equal to the demand on account of its growing on a much

MEDICINE.
Red Bark.
1133

CINCHONA
succirubra.

Hybrids of Cinchona

MEDICINE.

ing matter. The brick-red colouring matter is not found in the growing plant but in the dried bark, and Mr. J. E. Howard considers that it is

TIMBER.

II34

HYBRIDS.

II35

ations. They are now impregnated with resin which appears to have also become oxidised so as to act the part of an acid, and is with difficulty separated. But the most remarkable feature is the altered condition of the alkaloids themselves. Quinine, which formed a considerable portion of the whole, is now diminished, while cinchonine and cinchonidine remain much the same. The quill red bark of Indian plantations is a much better drug, some of it yielding 5 to 10 per cent. of alkaloids, less than a third of which is quinine and a fourth cinchonidine, the remainder being cinchonine and sometimes traces of quinidine (*Elborne*)

Structure of the Wood—Yellow, moderately hard. Pores small in radial lines; medullary rays, closely packed, fine and very fine.

HYBRIDS OF CINCHONA.

Kuntze, after examining the living Cinchonas in the Indian planta-

manifest a greater tendency to variation and hybridization than do the plants referred to the genus Cinchona. Mr. J. Broughton, in a report

that this ready hybridism between the species of Cinchona affords an explanation of the occurrence

Angustifolia.

II36

Bonplandiana

II37

C. II37

Chemical peculiarities of the Cinchonas

CINCHONA

guish it from the numerous self sown hybrids that are constantly appearing in the plantations. Of this form Mr C B Clarke wrote in 1871, that the gardener took it for *C pitayensis*. Mr McIver thought it was *C unta*.

variety
b. ch. 10

3 1 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

by hybridization or otherwise so as to produce a plant that will give the maximum of quinine or other alkaloid desired to be obtained

CHEMICAL PECULIARITIES OF THE CINCHONA PLANTS

We may conclude this account of the forms of Cinchona grown in India by displaying their chemical peculiarities in the following table of comparative analysis taken from Mr Lawson's report —

CHEMICAL
PECULIARITIES
1138

The Analyses of the different kinds of barks grown on the Government estates given below have been made during the past year by Mr Hooper, the Government Quinologist

		Quinine	Cinchonine	Quinine	Cinchonine	Amorphous alkaloids	Total	Sulph quinine
1	C officinalis natural	2.77	1.57	16	39	50	5.39	3.72
2	, mossed	3.40	1.50	20	45	62	6.17	4.37
3	, renewed	4.21	.85	22	65	70	6.63	5.66
4	C. angustifolia, natural	3.97	1.3	12	12	87	6.40	5.34
5	, mossed	5.60	1.41	33	04	97	8.35	7.53
6	, renewed	4.91	.89	33	19	114	7.51	6.60
7	C. succirubra natural	1.91	2.11		1.14	83	6.04	2.57
8	, mossed	1.69	2.03		1.63	93	6.33	2.27
9	, renewed	1.84	1.48		1.25	71	5.23	2.47
10	, branch	1.38	2.28		1.59	116	6.41	1.85
11	, root	1.24	.77	41	1.43	1.27	5.12	1.66
12	, renewed shavings	2.30	1.16		2.06	1.45	6.97	3.09
13	C. robusta natural	1.43	2.03		1.53	31	5.40	1.92
14	, mossed	1.92	3.16		.77	33	6.20	2.58
15	, renewed	4.40	2.54		.51	1.65	9.10	3.92
16	, branch	1.64	2.71		1.17	.50	6.02	2.20
17	C. micrantha natural				1.92	.40	2.3	
18	, renewed	tr	2.45		1.12	1.0	4.59	
19	, branch				1.60			
20	C. Calisaya natural	1.71	2.32		2.13	.45	2.05	1.62
21	, branch	.59	.73		1.93	.45	3.73	.79

CINCHONA
succirubra.

Hybrids of Cinchona.

MEDICINE.

bark acquires its colour, the cinchotannic acid in which it abounds having become oxidised and changed into cinchona red, and under these conditions the alkaloids also appear to undergo some corresponding alterations. They are now implicated with resin which appears to have also become oxidised so as to act the part of an acid, and is with difficulty separated. But the most remarkable fact is - the altered condition of the alkaloids in the bark of the whole tree. The alkaloids remain much the same, but much better dried than a third of being cinchonin.

TIMBER.

II34

HYBRIDS.

II35

Structure of the Wood - Yellow, moderately hard. Pores small in radial lines, medullary rays, closely packed, fine and very fine.

HYBRIDS OF CINCHONA.

Angustifolia.

II36

Bonplandiana

II37

allied to the form Bonplandiana. From the fact that it is reproduced by

Chemical peculiarities of the Cinchonas

CINCHONA

sively cultivated Dr King, in his report for 1874, says 'The analysis of the bark' of this hybrid or species 'shows it to contain much quinine. Since the discovery of this fact, every effort has been made to propagate this

by hybridization or otherwise, so as to produce a plant that will give the maximum of quinine or other alkaloid desired to be obtained

CHEMICAL PECULIARITIES OF THE CINCHONA PLANTS

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CHEMICAL
PECULIARITIES
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1	C. officinalis natural	2.77	1.57	16	39	50	5.39	3.72
2	" mossed	3.40	1.50	20	45	62	6.17	4.57
3	" renewed	4.21	.85	22	65	70	6.63	5.66
4	C. angustifolia natural	3.97	1.32	12	12	87	6.40	5.34
5	" mossed	5.60	1.41	33	04	97	8.35	7.53
6	" renewed	4.91	.89	38	19	114	7.51	6.60
7	C. succirubra natural	1.91	2.11		114	83	6.04	2.57
8	" mossed	1.69	2.03		1.68	98	6.38	2.27
9	" renewed	1.84	1.48		1.25	71	5.28	2.47
10	" branch	1.38	2.8		1.59	116	6.41	1.85
11	" root	1.24	.77	41	1.43	1.27	5.12	1.66
12	" renewed shavings	2.30	1.16		2.06	1.43	6.97	3.09
13	C. robusta natural	1.43	2.08		1.58	31	5.40	1.92
14	" mossed	1.93	3.16		.77	35	6.20	2.58
15	" renewed	4.40	2.54		51	1.65	9.10	5.92
16	" branch	1.64	2.71		1.17	50	6.02	2.20
17	C. micrantha, natural				1.92	40	2.32	
18	" renewed	tr	2.45		1.12	1.07	4.59	
19	" branch				1.60	45	2.05	
20	C. Calisaya natural	1.21	2.32		2.13	29	5.95	1.67
21	" branch	.59	.73		1.93	48	3.73	.79

CINCHONA

Chemical Peculiarities of the Cinchonas

CHEMISTRY

Analyses of different kind of barks grown on Government estates, &c.—contd.

		Quinine	Cinchonidine	Quinidine	Cinchonine	Amorphous alkaloids	Total	Sulph quinine
22	C. Calisaya var Anglica, natural	81	83	29	1 49	44	3 91	1 09
23	" " branch	tr	tr	25	2 04	36	2 65	
24	C Ledgeriana, natural	5 49	1 33		82	88	8 52	7 38
25	" " branch	2 21	49		1 07	50	4 27	2 97
26	C javanica natural			1 31	2 64	48	4 44	
27	" " branch			1 43	1 49	45	3 37	
28	C Humboldtiana, natural	2 24	1 55	tr	49	90	5 18	3 01
29	" " renewed	1 28	64		43	1 07	3 43	1 72
30	C pitayensis, natural	2 34	56	1 10	1 93	39	6 32	3 14
31	" " mossed	3 81	95	63	1 91	37	7 67	5 12
32	" " renewed	2 50	52	78	2 33	55	6 68	3 36
33	C nitida	1 42	2 45		1 45	67	5 99	1 91
34	Pahudiana natural	04	10		39	43	06	05
35	" " renewed	51	1 19		28	87	2 85	68

Dr King furnishes the following analysis of the yellow and hybrid barks of Bengal —

"The Sikkim plantations produce red and yellow barks. Of the yellow barks the following four analyses may be taken as characteristic —

Yellow Bark—(Sikkim).

Crystallized Sulphate of Quinine	•	3 93	4 83	6 04	3 49
Ditto of Cinchonidine	•	0 36	0 51	0 97	0 32
Ditto of Quinidine	•	traces	0 06	0 04	0 85
Cinchonine	•	0 17	0 21		

"But besides red and yellow bark the Sikkim plantations now produce a large quantity of hybrid bark, the composition of which may be seen from the following analysis of four samples —

Hybrid Barks—(Sikkim)

Crystallized Sulphate of Quinine	•	6 12	3 99	3 12	3 24
Ditto of Cinchonidine	•	2 46	3 33	1 21	2 46
Ditto of Quinidine	•	traces	traces	0 30	
Cinchonine (alkaloids)	•	0 55	0 57	0 71	0 52

CLIMATE, SITUATION, AND SOIL SUITABLE FOR CINCHONA CULTIVATION

CULTIVATION.

In Bengal
1139

Climate, &c, suitable for Cinchona Cultivation

CINCHONA.

CULTIVATION.

the Deccan hills. In Sikkim the minimum temperature of 40° and Fahrenheit, the mean minima for mean maxima 71·7° and 72·28° 65·6° and 64·89°, respectively fairly suitable for succubra, but rather cold for Lausaya. A more congenial climate for both species is indicated by the figures obtained at a lower station (elevation above the sea 2,556 feet) which, for the years 1866 and 1867, are as follow —

Minimum temperature	40° and	41° Fahr.
Maximum	92 3°	94°
Mean minimum temperature	59 3°	60 94°
Mean maximum	80 6°	81 59°
Mean temperature	70 1°	71 26°

"In various parts of Ceylon a favourable climate for Cinchona is obtained, as will be seen from the following extract from a most reliable local publication —

and Cinchona without being injurious to human health. Dismissing the heat, resulting, as we first rather misunderstood, their preference for incessant rain and mist

weather affects the plants in flag. In Sikkim, succubra makes its most vigorous growth during the latter half of the rains, but both on the Nilgiris and Himālayas the trees continue to grow for two months after the rains cease.

"Observations which have been made show that (calculated on the returns of five years) there are at Ootacamund no fewer than 218 dry days in the year and at Neddiwattam about 240 dry days. The rainfall of the former locality (on an average of three years) is about 44 inches per

"As regards elevation above the sea, it is found that in the Nilgiris succubra succeeds best at altitudes of from 4,500 to 6,000 feet. An elevation of 7,000 feet is found to be too high, the growth being too slow to be profitable. Pale or crown barks thrive in a zone above this, and seem

CINCHONA.

Treatment of the Removed Bark.

COLLECTION.

stems that had been operated upon with a coating of moss or straw in process were very satisfactory so discovered that, provided to coat the partially decorticated stems, Director of the Dutch plantations in Java, suggested a modification of this process which consists in shaving off the superficial layers of bark from the whole surface of the stem, care being taken that at no point shall the young wood be laid bare. Mr. Moens found that the bark of trees thus treated gradually acquires its former thickness, and that the renewed bark is richer in alkaloids than the original bark. This process has been successful in

(King).

not resorted to
the bark under
it ants" (Reso-

In
Madras.
II43

detail (than in

the Govern-
ment plantations is that known under the name of stripping. The barker, with the sharpened point of an ordinary pruning knife, makes several cuts running down the stem parallel to each other, about an inch apart, and then with the blunt back of his knife, he raises every alternate narrow

away. If, on the other hand, the layer of cambium cells is crushed or scratched off by clumsy workmanship, no new bark will be formed. In order to facilitate this new formation of bark the stem is covered with moss

the latter case it is either up-rooted and a young plant put in its place, or it is cut down and one or more shoots are allowed to spring up from its stool.

TREATMENT

TREATMENT OF THE REMOVED BARK.

Bengal.
II44

In Bengal—"After removal from the trees, Cinchona bark has to be carefully dried, and on the best modes of doing this careful experiments have been made. From these it has been found that exposure to a high

C. II44

Diseases of Cinchona Trees.

CINCHONA.

temperature, especially in a moist atmosphere, causes bark to become

TREATMENT
OF BARK.

mouldy and to ferment, as is apt to happen if it be taken off during wet weather, deterioration more or less serious surely occurs. Dry bark, on the other hand, will keep unchanged for many months. Mr Broughton calculates that trunk bark loses from 70 to 74·8 per cent of weight in 76 per cent. The Sikkim experience sees 73 per cent, and twig bark 75

In Madras — After the bark is removed from the trees it is dried by the sun or by artificial heat. It is then packed in gunny bags, forming for sale, and Mr. Broughton exposing the idence of this, of the fact, so cars, however,

In
Madras.
II45

DISEASES OF THE CINCHONA TREES

"Cinchona trees are liable to a kind of canker, which often destroys the terminal and lateral branches, and not unfrequently kills the plants outright. This canker is most abundant in situations where the subsoil is

DISEASES.
II46

CINCHONA.

Diseases of Cinchona Trees

DISEASES

ly fatal, the other local and by no means fatal. The former disease is confined entirely to trees which have been originally planted in damp situations or in situations which have become damp subsequently by the oozing of drainage water in the way already explained. Disease first attacks the roots of such trees. Its existence becomes apparent by the discolorization of their leaves, which ultimately fall off. Gradual shrivelling of the

occasionally these appearances extend to the wood, but as a rule they do not. In size the patches vary, many are about the size of a shilling; others are much larger. They are not numerous on one tree and are often confined to a single branch. When small no apparent affection of the general

prepared with a story as to its cause. This disease is not confined like the last to certain spots, but is found on plants in all parts of the plantation.

A careful examination of all that has been written and of the evidence recorded before the Commission led to the conclusion that the diseases were by the Mr McIver professional cause the damp soil to the late Mr Scott in his a probable cause of the the atmosphere checking

Calicut that of the

It may be concluded that, with care in the selection of sites and the more perfect system of cultivation now pursued all danger from disease has been practically removed

CINCHONA.

Government Cinchona Febrifuge and Quinine.

FEBRIFUGE.

power, and in equal circumstances their use produced almost the same physiological results.

"The use of cinchona bark as a febrifuge is well known to the Commission, and doubt, that of quinine, and at sulphate of cinchona, though considerably inferior to the other alkaloids, is, notwithstanding, a valuable remedial agent in fever.

"There is no longer room to doubt that the alkaloids are capable of being generally used with the best effects in India. They have been compared with quinine, a drug which possesses, more than any other that can be named, the confidence of medical practitioners here; and have been

others are more than half a century ago, and any

; and
other
d by

the quinine-maker as good American yellow. The establishment of the therapeutic excellence of these alkaloids largely increased the value of the red bark plantations in India, and made much easier of solution the problem of supplying its fever-stricken population with a cheap and effectual febrifuge. And for the solution of this problem the Government very speedily took active steps, by appointing Mr. J. Broughton, a skilled chemist educated in England, as Quinologist to the Nilgiri plantations. Mr. Broughton, after making some valuable observations on the chemistry of living Cinchonas and initiating a process for extracting the whole of the alkaloids from succubra bark, retired from the service of Government about 1877. The manufacture of Mr. Broughton's amorphous quinine was, however, discontinued on the departure of Mr. Broughton, and since then the whole of the bark produced on the Nilgiri plantations has been disposed of by sale. In 1873, Mr. C. H. Wood was appointed Quinologist to the Government plantation in Sikkim, and by him a process of manufacture was indicated by which the mixed alkaloids of red bark are extracted in the form of an amorphous white powder. This powder is called CINCHONA FEBRIFUGE, and up to the 31st March 1885, 70,491lb of this drug had been manufactured at the Sikkim plantation. This drug is disposed of only in India, and is

Government Cinchona Febrifuge and Quinine.

CINCHONA.

(but not powdered) and is put into wooden casks, where it is macerated in the cold with very dilute hydrochloric acid. The liquor is then run off into wooden vessels and mixed with an excess of a strong solution of caustic soda, a precipitate forms, which is collected on calico filters, and well wash-

FEBRIFUGE.

hours the liquor is carefully filtered. The filtrate is mixed with caustic soda, and the resulting precipitate collected on calico and washed with a small quantity of water, dried and powdered it is then ready for issue, and is sent out under the name of CINCHONA FEBRIFUGE."

QUININE,
1150

quinine in yellow bark can be extracted in a form undistinguishable, either chemically or physically, from the best brands of European manufacture. This can be done so cheaply that, as long as the supply of bark is kept up, quinine need never cost Government much above twenty-five rupees per pound. It is true that, at the present moment, quinine is obtainable in the open market at rates not very different from this; but that is due to entirely exceptional causes. For some time back the Ceylon planters have been up-rooting their Cinchona trees, both to save them from disease, and to make way for tea-planting which appears now to be becoming the principal industry of that Colony; and Cinchona

Method of extraction of the alkaloids from Cinchona bark by cold oil as used at the Government Cinchona Factory in Sikkim.

"In order that the oil may speedily and effectually extract the Cinchona

is driven at the speed of about thirty revolutions to the minute. Any

CINCHONA.

Government Cinchona Febrifuge and Quinine

QUININE.

(about 5 parts) may be used in addition to the 8 parts of caustic soda; or caustic soda may be altogether omitted, and 15 parts of slaked lime may be used instead of it. The caustic soda is dissolved in the water and mixed with the bark. Then the oil is added, and the whole is kept

agitated, and is there thoroughly intermixed with acidulated water for

second need not be a step. The amount of

allowed to cool, and as it cools the crystals form out. These crystals are

crystalline mass obtained by filtration is then placed in small lumps on sheets of white blotting paper, and on a slab of plaster of Paris.

is drained off, the precipitate is washed with a little plain water, and powdered. The powder is Cinchona Febrifuge ready for use."

TRADE,
1151

TRADE IN CINCHONA

PRESENT CONDITION OF THE BARK TRADE — Dr. King has kindly furnished the following paragraph on this subject — "The present condition

C, 1151

Foreign Trade in Cinchona.

CINCHONA.

of the Cinchona bark trade is one of depression. This is by no means due to any diminution of the demand for the Cinchona alkaloids, but in a great measure to the fact that an entirely new source of quinine has of late been discovered in the northern parts of South America. This

TRADE.

years been poured into the London market in enormous quantities under the designation of *Cuprea* bark. The depression is also greatly due to the enormous exports from Ceylon where cinchona is everywhere being up-rooted to make way for Tea. The effect of these flushings has been temporarily to swamp the market, the *Cuprea* crushing out the more costly Cinchona barks. The Cinchona planter, however, has only (if he can afford it) to play a waiting game for, if the importation of *Cuprea* bark goes on much longer at the present rate, *Remija* trees will soon become scarce in all easily accessible spots, and the exports from Ceylon must soon diminish. With the extension of civilization, and with the increase of wealth in tropical countries, the consumption of quinine must steadily increase, at any rate, as long as malarious fevers continue to exist in these countries.

1152

Remija plants have only recently been introduced into India. Plants are being grown in the Sikkim plantations, and Mr Lawson alludes to those in the Nilgiri plantations as too young to advance any opinions regarding the success of this new undertaking. It seems probable, however, that it may be found possible to cultivate the *Cuprea*-bark plant in regions where labour may be less expensive than is the case with the Cinchona plantations. *Remija perdicana* and *R. pedunculata* yield the *Cuprea* bark of commerce.

In the official correspondence regarding Cinchona, various opinions

plantations are not too numerous for profit." It must, however, be admitted
abando
can so
more t
meetin,
bark h

INDIAN FOREIGN TRADE IN CINCHONA AND QUININE

The market in the London
sumed a e the bark as-
for 1875 eview of Trade
imports of quinine in 1875-76 was Rs. 91,619, but it would seem that the value of the
removal of the import duty in August 1875 has stimulated the imports
which, in the nine months of the current year, are valued at Rs. 28,978
It is manifest that as yet, even with the aid given by Government in the

C. 1152

CINNABAR.

Foreign Trade in Cinchona Cinnabar.

TRADE IN
CINCHONA

shape of imported quinine and the alkaloids of Cinchona produced in India at the cost of the State, this valuable febrifuge can reach only a fraction of the population."

are greater than at any previous year. The exports of Indian Cinchona bark have steadily increased for years past. In 1882-83 they amounted to 641,608 lb valued at R7,90,861, and last year 1,286,900 lb valued at R14,56,381. Thus, both in quantity and value the exports are double what they were five years ago. These facts would seem to almost point

of
bled,
2-83
the
the
Cincha
India,
time
hoped, and indeed it has been somewhat a disappointment to those who invested in the business with expectations of large fortunes in the no distant future. The fall in prices and the competition of other countries have restricted the trade, but though its dimensions are still relatively small, the trade has been increasing."

In addition to the imports of quinine as a commercial article, reference

plantations the immense benefit conferred on the people of India by the Government effort to provide the only trustworthy specific against the

results of the Nilgiri plantations since their commencement shows a net surplus of profit of Rs 51,743 (£55,174) "

CINNABAR.

1153

See Mercury.

C. 1153

Shun-
rofes-
pro-

Camphor Wood

CINNAMOMUM
inersCINNAMOMUM, *Blume, Gen Pl, III, 155*

Cinnamomum Camphora, *Nees, Fl Br Ind, V, 134, Wight, Ic, t 1818, LAURINEÆ*

1154

JAPAN CAMPHOR of Commerce is obtained from this tree

Syn — CAMPHORA OFFICINARUM, *Nees, LAURUS CAMPHORIFERA, Kamp ; Roxb, Fl Ind, Ed C B C, 340*

Habitat — A tall tree, with smooth, shining leaves, a native of China, Japan, and Malay Islands, introduced into the Botanic Garden at Calcutta in 1802. This is one of the sources of camphor. For further information see Camphor

C. glanduliferum, Meisn, Fl Br Ind, V, 135.

1155

THE NEPAL CAMPHOR WOOD, THE NEPAL SASSAFRAS

Syn — LAURUS GLANDULIFERA, *Hall, in Act Ser, Med and Phys, Cal, 1, 45*

Vern — *Malligiri marigiri*, NEPAL, *Rohu, LEPCHA, Gunserai, MECHI, Ass, Gundroi, CACHAR*

References — *Brandis, For Fl, 376, Gamble, Man Timb, 306, Wight, Hort Sib Cal, 308, Pharm Ind, 196*

Habitat — A large tree of South Himalaya from Kumaon eastwards to Assam, the Khasia Hills, and Sylhet

Medicine — In the
reputed as worthy of

MEDICINE
1156

TIMBER
1157

C. iners, Reinw, Fl Br Ind, V, 130, Wight, Ic, t 130, 122, 135

1158

cinnamomic odour and taste, and by careful drying and preparation appears capable of affording *cassa lignea* of good quality

Dr. A. Ross
MEDICINE
Bark
1159

C. 1159

CINNAMOMUM
Parthenoxylon
Martaban Camphor Wood.
MEDICINE.
Branches.
II60
Seeds
II61
FOOD.
Bark.
II62
Leaves.
II63
TIMBER
II64
II65

states that this tree is very abundant in the Balaghat jungles of North Kanara, and that it was from this locality that the *cassia bark*, once so largely exported from that district, was obtained. The smaller BRANCHES when carefully prepared, he pronounces to be nearly equal to that of *C zeylanicum*. At his recommendation, Dr. Ross states, the Bombay Government now farms out these trees, and by this means a very considerable addition has been made to the revenue. It may be used as a substitute for cinnamon, to which, adds Dr Ross, it can hardly be reckoned inferior " (*Pharm Ind.*) "The SEEDS, bruised and mixed with honey, are used as a cathartic, and the LEAVES, and com-

(Lisboa) See

Structure of the Wood.—Billets of this tree are often sold, together with other kinds of firewood, by the wood cutters

Cinnamomum obtusifolium, *Nees, Fl Br Ind., V., 128; Wight, Ic, t. 139*

Syn.—**LAURUS OBTUSIFOLIA**, *Roxb, Fl Ind, Ed C B C, 339, L. CASSIA, in Herb Ham.*

Vern.—*Tespat, rantespat, kinton* BENG, *Bara singoli*, NEPAL, *Nupsor, Lercha, Patichanda*, ASS, *Dupatti*, MECHI, *Krowai*, MAGH, *Lu leng-kyaw*, BURM

References.—*Brandis, For Fl, 375, Kurz, For Fl Burm, II, 287; Gamble, Man Timb, 305, Voigt, Hort Sub Cal 307, Flick & Haub, Pharmacog, 528, Balfour, Cyclop, Simmonds, Trop Agri, 490; Kew Cat, 110*

Habitat.—An evergreen tree, with grey aromatic bark, quarter inch thick, native of the outer North-East Himalaya, ascending to 7,000 feet, and of Eastern Bengal, Burma, and the Andaman Islands.

Fibre.—The "Muga" silkworm (*Antheraea assamæ*) sometimes feeds on its leaves

Medicine.—Dr Kurz says the aroma of the BARK is variable, and the bark of the root of the Martaban plant is as aromatic as the best Ceylon cinnamon Dr Gimlette says the bark is "collected in Dunabaisia, a valley adjacent to that of Nepal proper, it is used in dyspepsia and liver diseases"

Food.—LEAVES are aromatic, used in curry. In Assam the dried leaves are used as a spice

Structure of the Wood.—Reddish grey, moderately hard, shining, mottled on a vertical section by the medullary rays, the pores containing a gummy substance which exudes copiously on the wood being wetted Weight, 41lb per cubic foot Balfour says that the wood is useful for various purposes

C. Parthenoxylon, *Meissn, Fl Br Ind, V., 135, Wight, Ic, t. 1832.*

THE MARTABAN CAMPHOR WOOD

Syn.—*C. zeylanicum*, *Roxb, Fl Ind, Ed C B C, 339, L. CASSIA, in Herb Ham.*

Vern.—*Tespat, rantespat, kinton* BENG, *Bara singoli*, NEPAL, *Nupsor, Lercha, Patichanda*, ASS, *Dupatti*, MECHI, *Krowai*, MAGH, *Lu leng-kyaw*, BURM

References.—*Brandis, For Fl, 375, Kurz, For Fl Burm, II, 287; Gamble, Man Timb, 305, Voigt, Hort Sub Cal 307, Flick & Haub, Pharmacog, 528, Balfour, Cyclop, Simmonds, Trop Agri, 490; Kew Cat, 110*

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C. 1172

MEDICINE.
Fruit
II71
oil.
II72

CINNAMOMUM
Tamala.

The Cassia Lignea.

Habitat.—A moderate-sized evergreen tree on the Hīmalāya, sparingly

DYE
Leaves
II84

Bengal the leaves and bark of *C. obtusifolium*, *Nees*, more commonly bear these names. In fact, the leaves of any species of the genus would be at once called *Teypat* by a native, but for economic purposes *C. Tamala* is superior to any of the other Indian species. The bark of this plant is the *Cassia Lignea* of Indian commerce. The *Cassia Cinnamon* of Europe is obtained from China, the source of which is still obscure. It is chiefly, however, attributed to *C. Cassia*, *Bl*, which it seems may be proved but a form of *C. Tamala*, *Nees* (Gamble reduces it to be a synonym). The true cinnamon is, however, *C. zeylanicum*, *Breyn*. The roots of *C. zeylanicum*, as also, sparingly, of *C. Tamala* and *C. obtusifolium*, yield camphor, but the true camphor plant of commerce is *C. Camphora*, *Nees*, a native of Japan.

OIL
II85

Oil.—The outer bark of the plant yields on distillation an essential oil has a to it what

Anna-
mon or *Cassia Lignea* of Indian commerce is obtained from this plant. It is coarser and sold in larger pieces than the true cinnamon or bark of *C. zeylanicum*, for which it is often used as an adulterant. Kurz says the bark of the root is quite as good as the true cinnamon bark. In Manipur the writer found the natives on the eastern frontier regularly in

but on this point Flückiger and Hanbury, in their *Pharmacographia*, say: "Although it is customary to refer it (*Cassia* bark) without hesitation to a tree named *Cinnamomum Cassia*, we find no warrant for such reference, no competent observer has visited and described the *Cassia*—"

CASSIA
BUDS,
II86

C. II86

The Cassia Lignea

CINNAMOMUM
Tamala

of the bark It appears from a very old writing that the cassia buds were employed in preparing the spiced wine called *Hippocras* (*Pharmacog. Treasury of Botany*) Dr. Dymock alludes to "Kāla nāgkesar (known in Europe as Cassia buds)" as the immature fruits of Cinnamomum. Cassia buds are also known as "cassia buds" from

CASSIA
BUDS.in
byCASSIA
BARK
1187

straight, even and regular, and are of a darker brown, and though some of the bark is extremely thin, other pieces are much stouter than fine cinnamon,—in fact it is much less uniform The outer coat has been removed with less care than that of Ceylon cinnamon, and pieces can easily be found with the corky layer untouched by the knife

"Cassia bark breaks with a short fracture The thicker bark cut transversely shows a faint white line in the centre running parallel with the surface Good cassia in taste resembles cinnamon, than which it is not less sweet and aromatic, though it is often described as less fine and delicate in flavour.

"An excellent article of commerce is the bark of the Cassia

flavour

"The less esteemed kinds of cassia bark which of late years has been

MEDICINE
Bark
1188
Leaves.
1189

The Cassia Lignea.

CINNAMONUM
Tamala.

Structure of the Wood—Reddish grey, splts and warts, moderately hard, close grained, slightly scented, not used Weight 39 lb per cubic foot

TIMBER.
1193

1194

thing can be gathered as to the likelihood of its being grown to a profit in Bengal as a source of Cassia bark "

FOREIGN TRADE OF CASSIA LIGNEA

TRADE.
1195

Year	IMPORTS		EXPORTS AND RE EXPORTS	
	Quantity	Value	Quantity	Value.
	cwt	R	cwt	h
1830-81	19,660	4 63,576	4,437	1,18,249
1831-82	9 705	1,90,891	3 865	94,408
1832-83	13 240	2 61,543	2,211	45 921
1833-84	19 917	3 84 491	5,365	1,05,310
1834-85	14,769	2,43,344	4 692	81,394

Imports for 1834-85

Presidency to which imported	Quantity	Value	Country from which imported	Quantity	Value
	cwt	R		cwt	R
Bombay	12 308	2,01 944	Aden		
Bengal	2,226	41,400	China—Hong-kong	13 537	2,24 803
Madras	235	4 940	Straits	1,212	23 536
TOTAL	14,769	2,43,344	TOTAL	14 769	2,43,344

Re exports for 1834-85

Presidency from which exported	Quantity	Value	Country to which exported	Quantity	Value
	cwt	R		cwt	R
Bombay	4 675	81,114	Persia	2,785	49 936
Bengal	13	225	Arabia	930	17,051
Sindh	4	55	Turkey in Asia	715	11 956
			Other Countries	212	3 561
TOTAL	4 692	81,394	TOTAL	4 692	81,394

Dr Dymock (*Mat. Med., W. Ind., 2nd Ed., 667*) alludes to Cassia

of the truly Indian bark is exported

CINNAMOMUM
zeylanicum

True Cinnamon.

1196

Cinnamomum zeylanicum, Breyn.; Fl. Br. Ind., V., 131; Wight,
TRUE CINNAMON. [Ic, t. 123.

S.

"

"

"

"

Murray, Drugs and Pl Sind, 110; Bide, Cat Nam & Rou, 1414, 1415,
15, Waring, Basar Med., 43; S Arjun, Bomb. Drugs, 116; Baden

CAMPBOR.

1197

DYE

1198

p^h from the barkfrom Nepal and from the North-
together with myrobalan, chiefly
referred to (Ruck Dyes and Tans of

OIL

1199

of cinnamon, an

is at present unknown

. description

C. 1199

True Cinnamon.

CINNAMOMUM
zeylanicum

here and there scars or holes at the points of insertion of leaves or twigs. The inner surface of the bark is of a darker hue. The bark is brittle and splintery, with a fragrant odour peculiar to itself and the allied barks of the same genus. Its taste is saccharine, pungent, and aromatic" (*Pharmacographia*, p. 525)

MEDICINE.
Bark
I200

Oil.
I201

Carbon having the formula $C_{20}H_{16}$. It also contains a small quantity of benzoic acid. In medicinal properties and uses it resembles closely the oil of cloves (*Pharm Ind*). "Cinnamon is largely used in compound prescriptions. A combination of cinnamon, cardamoms, and *tejapatra* leaves, passes by the name of *trijataka*, these three aromatics being often

Special Opinions—§ "Powdered cinnamon in 20-grain doses is a reputed medicine in dysentery" (*Assistant Surgeon T. N. Ghose, Meerut*). "Appears to be useful in certain forms of amenorrhœa when chewed or as Oil Cinnamon" (*Surgeon-Major G. Y. Hunter, Karachi*). "The bark ground up with water into a paste is applied to the temples in neuralgia and severe headache" (*K. N. A., Dacca*). "Warm stomach cordial, carminative and astringent, useful in flatulence and diarrhœa. Cinnamon oil applied locally in very small quantity gives great relief in no only headache" (*Surgeon C. M. P. Hall, M.D. Ceylon*).

England. It was prepared by Valerius Cordus, who stated, somewhat before 1544, that the oils of cinnamon and cloves belong to the small number of essential oils which are heavier than water, '*fundum petunt*.' About 1571 the essential oils of cinnamon, mace, cloves, pepper, nutmegs, and several others, were also distilled by Guintherus of Andernach, and again, about the year 1589, by Porta.

"In the latter part of the last century it used to be brought to Europe by the Dutch. During the five years from 1775 to 1779 inclusive, the average quantity annually disposed of at the sales of the Dutch East India Company was 176 ounces. The wholesale price in London between

with a variable proportion of hydrocarbons. At a low temperature it

C. I202

CINNAMOMUM
zeylanicum

True Cinnamon

CHEMISTRY

not examined
ed with res n

and tannic
Wittstein to
decoction of
Cinnamon
afforded to Schatzlar (1862) 5 per cent of ash consisting chiefly of the

recognition but if it should have been reduced to powder, the case is
widely different We have found the following tests of some service
when the spice to be examined is in powder Make a decoction of
powdered cinnamon of known
of the suspected powder
each with one or two drops of
mon is but little affected but in that of cassia a deep blue black is
zero,
ell as
ed by
with

infec-
tionary, also in curry, and enters into the preparation known as *pan*

FOREIGN TRADE OF CINNAMON

Year	IMPORTS		EXPORTS AND RE EXPORTS	
	Quantity	Value	Quantity	Value
	lb	Rs	lb	Rs
879-80	1 785	484	202	24
1880-81	7 707	3 511	19 432	4 833
881-82	2 244	512	67 466	14 430
1882-83	18 731	3 641	27 768	11 068
1883-84	13 687	2 640	35 181	9 330

Detail of Imports 1883-84

Province into which imported	Quantity	Value	Country whence imported	Quantity	Value
	lb	Rs		lb	Rs
Bengal	9 6	437	Straits Settlements Other Countries	11 924	2 034
Madras	12 547	2 143		1 763	606
British Burma	224	60			
TOTAL	13 687	2 640	TOTAL	13 687	2 640

FOOD
Bark
I203
TRADE
I204

CINNAMOMUM
zeylanicum

True Cinnamon,

CHEMISTRY.

not examined
ed with resin

and tannic
Wittstein
decoction of
Cinnamon
afforded to Schatzlar (1862) 5 per cent. of ash consisting chiefly of the
og, 526).
lia remark that "Cassia
very commonly substi-
re is no difficulty in its
1 to powder, the case is
widely different we have found the following tests of some service
when the spice to be examined is in powder Make a decoction of
powdered cinnamon of known genuineness, and one of similar strength
of the suspected powder When cool and strained, test a fluid ounce of
each with one or two drops of tincture of iodine A decoction of cinna-
mon is but little affected, but in that of cassia a deep blue black tint is

FOOD
Bark
I203
TRADE
I204

tionery, also in curry, and enters into the preparation known as *pan*.

FOREIGN TRADE OF CINNAMON

Year	IMPORTS		EXPORTS AND RE EXPORTS	
	Quantity	Value	Quantity	Value
	lb	R	lb	R
1879-80	1 785	484	202	4
1880-81	7,707	3 511	19 432	4 833
1881-82	2,244	512	67,466	14 436
1882-83	18,731	3,641	27,768	11,068
1883-84	13,687	2 640	35 181	9 330

Detail of Imports, 1883-84

Province into which imported	Quantity	Value	Country whence imported	Quantity	Value
	lb	R		lb	R
Bengal	916	437	Straits Settlements Other Countries	11 924	2 034
Madras	12 547	2,143		1,763	606
British Burma	224	60			
TOTAL	13 687	2,640	TOTAL	13,687	2 640

CITRULLUS
Colocynthis

False Pareira Brava; Colocynth

MEDICINE.

- Root
- I207
- Bark
- I208
- Leaves
- I209

wedge-shaped rays, which are often irregular, scattered, and indistinct. The axis is not often eccentric. In *Cissampelos Pareira* the root and stem are nearly alike in structure, and in transverse section there are concentric rings" "(*Year-Book of Pharm*, 1873, 30)

Medicine—The dried root and bark are used as mild tonics and diuretics in advanced stages of acute and chronic cystitis and catarrhal affections of the bladder, also exercises apparently an astringent and sedative action on the mucous membranes of the genito-urinary organs. They are generally administered in the form of decoction and extract. The leaves are applied to abscess. Ainslie writes; "The leaves of this plant are considered by the *vytians* as of a peculiarly cooling quality, but the root is the part the most esteemed, it has an agreeable, bitterish taste, and is considered as a valuable stomachic. It is frequently prescribed in the latter stages of bowel complaints, in conjunction with aromatics. *Cissampelos Pareira* has been very highly extolled by several writers for its medical virtues, particularly by Sloane, Marcgraaf, Barham, and Wright. The first speaks of the efficacy of the leaves as a vulnerary for

Special Opinions.—"Used locally in cases of unhealthy sores and

CHEMISTRY.
I210

a yellow bitter principle, a brown colouring matter, starch, an azotised substance, and various salts of ammonia and lime" (*O'Shaughnessy*).
The root the substance follows which exists to

to Fluckiger,
Warden, Pro-

- Cissus carnos*a, Lam, see *Vitis carnos*a, Wall, *AMELIDÆE*.
- C. discolor*, Blume, see *V. discolor*, Dals.
- C. edulis*, Dals., see *V. quadrangularis*, Wall.
- C. pedata*, Lamk, see *V. pedata*, Vahl.

CITRULLUS, Schrad.; *Gen. Pl.*, I, 826.

I211

Citrullus Colocynthis, Schrad; *Fl. Br. Ind*, II., 620; *Wight, Ic*,
I 498; *CUCURBITACEÆ*.

COLOCYNTH, Eng.

C. I211

The Water melon

CITRULLUS
vulgaris

it, butter taste, and contain 17 per cent of fat
t, if rubbed, emit a very unpleasant smell "

armacy (1873) gives the following account

FOOD
Fruit
1217

maragata, ...
limba (arab) ...
Trugata ...
indrak G ...
Duk, ...
Payumati, ...
utite, TAN ...
veri puch-chag ...
kayi, KAY ...
varuni milk ...
tolkh, khar-busaka ...
khia si, khia si ...
References — Thwaites ...
101, Stewart Ph Pl ...
Ind, 94, Modern ...
Pharmacop, 2/3, ...
Mat Med Hind ...
Mat Ind, 1 84, ...
and Drugs Sind, 39 ...
Year Book Pharm, 1893 ...
U Pl 139, Baden Powell ...

st freed from pulp by roasting
sacks, and then deprived of
by grinding and winnowing.
ild only taste, but several, if
The kernels contain about
luminous substances, be-
e be regarded as a suffi-

l with cold water, dried
1 other ways as food "
l as food for horses
cold winter nights
ously been pierced
aters, until all the

Kernels
1218

Habitat — An annual found wild in ...
eral, and South India It is the wild gourd

The plant cannot be said to be systematic ...
India, the fruits are collected from plants ...
desert tracts of North-West India (Duthie and ...)

Oil — Yields, according to Ainslie, a clear, ...
the southern provinces for burning in lamps ...
used to dye the hair

h The people
ch they use for
nts the camels
icog, 297)

DOMESTIC.
Tooth-
brushes.
1219
Tar
1220
1221

ascites, enlargements of the abdominal viscera, urinary ...
An oil prepared from the seeds of Indian Colocynth ...
ening grey hairs A poultice of the root is said to be useful ...
of the breasts." (U C Dutt, Mat Med Hind) According to ...
madan writers, Colocynth is a drastic purgative, removing ...
parts of the system They recommend the fruit, leaves and ...
used in costiveness, dropsy, jaundice, colic, worms, elephantiasis ...
acts as an irritant on the uterus, and its fumigation brings on the ...
flow The author of the *Makhsan* describes a curious mode of ...
tration "A small hole is made at one end of the fruit and ...
are introduced, the hole is then closed, the fruit enveloped in

BC, 700
samanka,
ana, Pn ...
Turbid,
Pittha,
kachrehn,

Pl, 95,
2, U, C
Ainslie,
Pb Pr,
1, 701;
the &
3, Dic,
2

espe-
well
ch
the
ten
son
in
cr-

CITRULLUS
Colocynthis

Colocynth.

Colocynth is rarely employed alone, it is generally given in combination with other purgatives and carminatives. It commonly causes griping when used alone, in excessive doses it produces inflammation of the intestines and even death. The principal efficient forms for the use of this drug are the compound extract of Colocynth, compound Colocynth pill, and Colocynth and henbane pill. (*Bentley and Trim, Med. Pl., 114*) From the pulp a watery extract is prepared, which is much

compound extract of Colocynth
the supply of the medical

stores. In Panjab the fruit is extensively employed as a purgative for horses. The pulp of the fresh fruit mixed with warm water, or the dried pulp with *aywain*, is reckoned a special remedy in cholera. The dried root reduced to powder is given as a purgative (*Bellew*). Stocks says the root and the juice are both used medicinally in Sind. In a report of the drugs shown at the late Colonial and Indian Exhibition from Baroda, the properties of the fruit and root are given in very nearly the same terms as above, so that the knowledge of this drug seems very extensively diffused over India.

Special Opinions — "Used in dropsy and amenorrhœa" (*Native*

CHEMISTRY
1216

principle remains partly in the aqueous liquid, partly in the resin, from which the *Colocynthin* is to be extracted by boiling water. The whole solution was then concentrated and mixed with carbonate of potassium, when a thickish viscid liquid separated. Hubschmann dried it and redissolved it in a mixture of 1 part of strong alcohol and 8 parts of ether. After treatment with charcoal, the solvents were distilled and the remaining bitter principle removed by means of water. This on evaporating afforded 2 per cent. of the pulp of a yellow, extremely bitter powder, readily soluble in water or alcohol, not in pure ether. Colocynthin is precipitated from its aqueous solution by carbonate of potassium. Colocynthin was further extracted by Lebourdais (1848) by evaporating the aqueous infusion of the fruit with charcoal, and exhausting the dried powder with boiling alcohol.

"Again, another method was followed by Walz (1858). He treated alcoholic extract of colocynth with water, and mixed the solution, firstly,

purgative, it is decomposed, according to Walz, by boiling with hydrochloric acid, and then yields colocynthein, $C_{24}H_{36}O_{12}$, and grape sugar. The extract of colocynth is mixed with

ordered us
hey have,

The Water melon

CITRULLUS
vulgaris

even when crushed, but a faint, bitter taste, and contain 17 per cent of fat oil.

"The fresh leaves of the plant, if rubbed, emit a very unpleasant smell" (*Pharmacog.*, p. 296)

Food—The *Year Book of Pharmacy* (1873) gives the following account of the fruit as a food substance—

"The FRUIT, which is about as large as an orange, contains an extremely bitter and drastic pulp, from which colocynth is obtained. This pulp is said to be eaten by buffaloes and ostriches, but is quite unfit for human food. The seed kernels, however, which contain but a very small quantity of bitter principle, are used as food by some of the natives of the African desert and their Asin,

The kernels contain about albuminous substances, therefore be regarded as a suffi-

"The KERNELS are heated to boiling, then washed with cold water, dried and powdered and eaten with dried dates, or used in other ways as food" (*Bentley and Trimen*). "The fruits are often used as food for horses in Sind, cut in pieces, boiled, and exposed to the cold winter nights. They are made into preserves with sugar, having previously been pierced all over with knives, and then boiled in six or seven waters, until all the

FOOD
Fruit
I217

Kernels,
I218

DOMESTIC
Tooth-
brushes.
I219
Tar
I220
I221

Citrullus vulgaris, Schrad., *Fl. Br. Ind.*, II, 621

THE WATER-MELON.

Syn—*CUCURBITA CITRULLUS*, Linn., Roxb., *Fl. Ind.*, Ed. C.B.C., 700

Vern—*Tarbua*, *tarbus*, *turmika*, *karbu*, *halinda*, *hindwana*, *samtanka*,

لکڑی, پايہ, ٹہا یاٹلی BORN

References—*Dal.* & *Gibb*, *Bomb.* *Fl.*, 103, *Stewart*, *Pb.* *Pl.*, 95,

Habitat—Cultivated in gardens &c. in the Punjab &c.

CITRULLUS
vulgaris

The Water melon.

HISTORY

History.—*Citrullus vulgaris* is indigenous to Southern Italy, while
Seringi It was after-
wards
saw dis-
of wild animals eagerly devoured the
the ancient Egyptians, as appears from
only received the plant in the tenth c
Orig. Cult. Pl., 263)

Oil.—The seeds yield a clear, bland, pale coloured, limpid oil, used for
burning in lamps, and probably also as an edible oil (*Cooke*)

OIL.
I222
MEDICINE

Seeds
I223
Juice,
I224
says t
use
and ar
remar
and a
ministered it with good results

Special Opinion.—§ "Cooling as well as a diuretic" (*Assistant Sur-
geon Anund Chunder Mukerji, Noakhally*)

Food.—The FRUIT is large, ovoid, green, and smooth, the flesh is whit-
ish yellow or red. The SEEDS are compressed and variable in shape and
colour, they are sometimes dried and the kernels eaten. Stewart says
they are eaten parched with other grain. In the North-West Provinces

FOOD
Fruit
I225
Seeds
I226

such numbers as to form for some months in the year no small part of the
food of the scanty population. The seeds of these and of other cucurbita-
ceous plants cultivated in gardens are ground during times of scarcity into
a kind of flour" (*Raj Gas* 31). The water-melons of the North-Western
Provinces are famed all over India and are used as refrigerants, and as a
sherbet ingredient.

I227

Var *fistulosus*, *Stocks*, *Duthie & Fuller, Field and Garden Crops*,
N.-W. P., II, 46, Plate XLVII

In the *Flora of British India* *C. fistulosus* has been given as a syn-
onym to *C. vulgaris*, *Schrad.*, but it seems desirable to retain it as a
variety.

Vern.—*Tandús, tendu, tind albinda, lens, N. W. P.* *Tinda, albinda*,
dulpasand, Ps. *Mehe, trindus, dulpasand, tinda, albinda, SIND*

References.—*Stewart, Pb Pl.*, 96. *Balfour, Cyclop.*

Habitat.—In the North-West Provinces this fruit is sown some
little time before the rains, the fruit ripening during the rains. "Culti-
vated in Sind from April to September, generally in the same plot of
ground with common melons, gourds, and cucumbers. In the North-
s before
r vege-

MEDICINE
I228
FOOD
I229
Pickles
I230

the size

The Genus Citrus.

CITRUS.

black
lt, and
anner.
ls, and
cks, in

Hooker's Journal of Botany, quoted by Brandis and Marshall;

CITRUS, Linn. Gen. Pl., 1., 305.

1231

Rut

This genus comprises 5 tropical Asiatic species and 2 Australian.
The different varieties of the Orange, the Lemon, the Lime, and the Citron have been critically examined by a large number of patient and careful observers, but, it must be admitted, with but indifferent results. Brandis, after presenting a concise and pregnant account of the Indian

results regarding the spread and changes of arborescent species under cultivation." Since these words were penned, it is feared we have not advanced very far towards a solution of the problems which hinge upon the nativity of the orange and the lemon. Shortly after the appearance of Dr. Brandis' *Forest Flora*, Dr. Rice of New York published in *New Remedies* a most interesting account of the genus Citrus, but without

Risso, as a synonym under *C. nobilis*, *Lour.* (the Mandarin)—a species

mamillate in the oranges. Species characterised by the degree of development of a certain feature must naturally under cultivation become hopelessly intermixed, hybridisation rendering it almost impossible to distinguish the forms. This is true in its fullest extent with the mem-

ber of the genus *Citrus* and to such an extent as to make it impossible to distinguish the forms. This is true in its fullest extent with the mem-
C. A. long with
 he writer
 means so
 The limes
 aurantium,
C. Auran-
 er of the
 end of *C. Medea*. Whether *K* is the correct name or whether not line of

C. Aurantium by their very much smaller flowers. It is usual to regard
 larins,
 culti-
 navia
 the *Khasia* hills but
 of good Mandarins as
 The true Mandarin,
 but it would be in-
 teresting to have the question of its relation to the sweet lime more clearly
 established. According to *Kurz*, these two cultivated plants are one and
 the same species, *C. nobilis*, being much cultivated all over Burma. This
 conclusion may not, however, be regarded as satisfactory, from the fact
 that the *Mandarin* and all other species of *Citrus* are extremely close of the

subsequently), may be found useful:—

- *Young shoots and leaves perfectly glabrous; transverse vesicles of the pulp concrete.*

† A shrub, young shoots purple; petiole more or less naked, petals generally tinged with red; flowers

The Sweet Orange

CITRUS
Aurantium.

often unisexual, stamens 20-40, style long, thick,
fruit globose, ovoid or oblong, often mamillate,
rind very thick and rough. C. Medica.

†† A t

low or orange coloured 2. C. nobilis (and
P C. Limetta)

NOTE.—If *C. Limetta* be added as a synonym of *C. nobilis*
the definition of the rind would have to be modified

†† A

walnut, thin thick, yellow

C. Hystrix.

††† A tree, young shoots whitish, petals more than
twice the length of those in the two preceding spec-
ies, flowers bisexual, stamens 20-30, style long,
thick, fruit globose or flattened, pulp sweet, acid
or bitter C. Aurantium.

** Young shoots and under-surface of the leaves pubescent,
transverse vesicles of the pulp distinct C. decumans.

value.

Citrus Aurantium, Linn (in part); *Fl Br. Ind.*, I, 515, *RUTACEÆ*

1232

The name *Aurantium* is not derived from the Latin *Aurum* "gold,"
but comes to us from the Arabic *narandj*. This became *narendj* (*narang*)
in the Persian, and its equivalent in Sanskrit is *nagaranga*, and in Hin-
dustani *narangi*. Names beginning with *nar* are generally associated
with fragrance. The name for the orange first reached Europe through
the Moors, and became *naranga* in Spanish, *laranga* in Portuguese,
Arancio in Italian and named in all the principal languages.

wards a

as also

bitter or

orange

DeCandolle, sive Turneri, &c

Var. 1. *Aurantium* proper (var β dulcis, Linn) (For var 2, see p. 315)

Botanical Diagnosis.—Petiole naked or winged, pulp sweet, yellow,
very rarely red, rind loose or adhering

THE SWEET ORANGE, CHINA ORANGE, PORTUGAL ORANGE,
Eng, ORANGER, *Fr*, ARANCIO DOLCE, PORTOGALLO,
MELARANCIO, *It*, NARANJO, *Sp*, LARANJEIRA DE FRUTO
DOLCE, *Port*, APFELSINE, SÜSSER POMERANZENBAUM,
ORANGENBAUM, *Germ*, PORTOGALLO, *Gr*, LARANJAS, *Ras*.

Var 1st
Aurantium,
1233

C. 1233

CITRUS
Aurantium.

The Sweet Orange.

Vern.—*Nāraṅgi, sanglara, nāraṅj, nāraṅgi, nāraṅge, sunthura, amrit-phal, kumla nēbu, HIND.; Kamlā nēmbu, nāraṅgi, nāraṅga, BENG.;*

Re

Pharmacop., 124, *U. S. Dispens.*, 1554 &c, 161; *Penit & Linn.*, *Med Pl.*, 51; *U. C. Dutt, Mat. Med. Hind.*, 127; *Dymock, Mat. Med. W. Ind.*, 107; *Ainslie, Mat. Ind.*, I, 281; *O'Shaughnessy, Beng. Dis.*

10257, *Piesse, Perfumery*, 159, *Daigong, Cylind.*, *Smith, Lit. Jour.*

Habitat.—Cultivated in most parts of India, but specially so in the

oranges, but there are large tracts where none or inferior kinds only are produced. In India the fruit generally ripens between December and March, according to the climate of the locality. A variety which flowers twice a year (February and July), and yields two crops—the first

HISTORY.

ning of the Christian era." It was, according to some authors, taken to Europe by the Portuguese about 1548, the first tree having stood for some time at Lisbon. From this point, the cultivation of the sweet orange spread to Rome and along the Mediterranean. DeCandolle, however, is of opinion that the sweet orange may have reached Europe before the

The Sweet Orange.

CITRUS
Aurantium

HISTORY.

sweet and the bitter orange were unknown to the Romans. Whether or not the Portuguese deserve the credit of introducing the orange to

that the orange is a native of China, the names given to the various forms are represented by a particular character which occurs in the most ancient Chinese writings, whereas the names given to the pumelo and the lime are of a much more modern character.

Dr. Bonavia has given the subject of the Indian Oranges, Limes, and Lemons more careful consideration than any other Indian authority. In

derived from the Sanskrit. It is, according to the best authors, a Persian corruption, and it can hardly be doubted that Santara is derived from Cintra—a town famous for its fruits. Yule-Burnell say "As early as the beginning of the fourteenth century we find Abulfeda extolling the fruit of Cintra. His words, as rendered by M. Reinaud, run "Au nombre des dependances de Lisbonne est la ville de Schintara, à Schintara on recueille des pommes admirables pour la grosseur et la gout". That these *pommes* were the famous Cintra oranges can hardly be doubted. Baber (*Memoirs of Zehir-ed din Muhammed Baber, Emperor of*

me of Sangtarah, which is, for a species of the fruit nge in Portugal would ac- e name Cintra, but for the of Portugals has adhered s might be quoted in sup- other fruit in (Tarans), but the skin of , page 328) Kirkpatrick, in Nepaul *Santola* orange as ays, "I take to be a corrup-

CITRUS
Aurantium.

The Sweet Orange.

HISTORY.

the supposed parent of
This belief (held very
t the opinions publish-
ed in Dr Bonavia's paper, alluded to above Referring to the small
ver the North-West
inge is called *Santo-
utwal* orange The
Mr J. H. Fisher,

that as he was unable to visit the locality he never had an opportunity of
seeing these wild trees" Both the last mentioned writers appear to
allude to sweet oranges, but it would be unsafe to infer, even from the
existence of what is said to be a tree from which they were

CULTIVA-
TION

writers

CULTIVATION OF ORANGES IN INDIA—There are two great centres
of sweet orange cultivation in India—the Khásia Hills and Silhet on the
eastern side and Nagpur in the central tracts of the country The
former grows the *C. nobilis* and the latter the *Bombay* and *Santo-
utwal*

is drawn from Diwar, Gurgaon, &c. The opening up of the new trade
between the two countries has led to the introduction of the *Bombay* and *Santo-
utwal* oranges into the former country.

Darjeeling, an orange is sold that much resembles the sweet oranges
of Ceylon

Dr Bonavia refers the sweet oranges to four cultivated races, two of
which should most probably be referred to *C. nobilis*, namely, the
Mandarin and the blood-red Maltese like orange found at Gujranwala
The Maltese orange proper has recently been introduced into India, and
is being cultivated at Jounpore and other localities From an industrial

The Sweet Orange.

CITRUS
Aurantium.

or economic point of view, it is of little consequence whether, a sweet orange be referable to *C. Aurantium* or *C. nobilis*; we may therefore

CULTIVA-
TIONTHE RACES
OF SWEET
ORANGES.

Race 1st,
Santara.

1234

ber, December, and January.

Vern—T

form

BENG.

kompha

tenga.

latter in N.W. P. for the same orange), *Santara*, C.P. (near Wardha)

two crops are obtained, one ripens in spring known as the *miragahar*.

Mr. Morris (in his Godavery District, Madras Presidency) says: "a

name with it. The plant could scarcely have been indigenous to both

ora

and

The ora is a thick tree, met with in the Godavery District, Mr

Race 2nd,
Keonia

1235

darker colour, thinner, and adhesive (e.g. jacket not loose). This is the orange that comes latest into the Calcutta market. It is plucked about

CITRUS
Aurantium.

The Sweet Orange.

RACES OF
SWEET
ORANGES

Before proceeding to discuss the third class of sweet oranges referred to by Dr. Bonavia it may be as well to refer to another author. Mr. Atkinson says of Kumaon: "The sweet orange is the form most usually cultivated, and there are several local varieties, some named after the localities in which they are produced, and others according to specific

names derived from a common source, and that the oranges they represent should be isolated from those designated *Santara* or some derivative from that and if these uncertainties

doubts may be entertained it is a coincidence not in section with any other names so much alike as remote parts of India

and be used
could be 1
may be four
That writer
"The orange
petioles at
and with gl
late, acumin

possible to avoid the conviction that too strong opinions have, by all

tioned regarding the vernacular names as given to the various forms of the Indian sweet oranges of cultivation (and even to the supposed wild oranges of Nepal), is sufficient to justify the conclusion that the whole subject is still involved in the utmost obscurity. A scientific exploration

Rare 3rd.
Malta.
1236

The oranges of Burma, for example, may have been derived from the indigenous plant, a species to, that from which the Be that as it may, a

of the blood red forms, India might obtain a supply of oranges in

C. 1236

The Sweet Orange

CITRUS
Aurantium.

the hot season, the time when these fruits would be most acceptable. Speaking of the Gujranwala oranges Dr. Bonavia says Colonel Clarke introduced these from Malta in 1852-56 Dr. Bonavia himself in 1863, and Mr C Nickels 2. Prior to the Mutiny blood it there must have been earlier From these centres, however, the cultivation of the red oranges has been greatly extended, so that they are now met with in most districts in Upper India. At Poona a blood orange is grown under the name of the *Mussembi*, a name given

RACES OF
SWEET
ORANGES

1237

opinion, simply perfect. I thought them equal to that of the blood oranges of Malta." "Mr. Steel states that the soil on which they grow is But the real secret, he thinks, is

there is a suitable soil and climate
is also skill to turn these materials to

oranges, and therefore would not compete with the *Santapa* oranges, which flood the Calcutta and Bombay markets from Silhet and Nagpur." Mr. Steel reports that in February they are "barely ripe, and would remain on the trees till the middle of March." Last year, some by careful packing were kept in good condition till July."

Race 4th.
Mandarin.
1238

the true Mandarin, while found in Ceylon, does not exist in India. Mr. C B Clarke, on the other hand, says the cultivation of this form is rapidly extending in the Khasia hills Dr. Bonavia recommends its introduction in "the highlands of Bengal," "where it would be out of the influence of the hot winds," which have killed or rendered useless all the plants grown in Upper India.

in
the
Nagpur

1.—ORANGES OF SILHET AND THE KHASIA HILLS—A most instructive paper appeared on this subject in the Journal of the Agri-Horticultural Society of India, from the pen of Mr. C. Brownlow (Vol I, Part IV, New

Silhet.
1239

C. 1239

CITRUS
Aurantium.

The Sweet Oranges of Silhet.

ORANGE PRO-
DUCTION IN
INDIA.

Series, 1869, p. 372). Mr. Brownlow gives the fullest particulars regarding the "Orange groves of Shalla," his paper being a model after which all

tion, collection, and transport are neatly disposed of. Indeed, so admirably has Mr. Brownlow fulfilled his task that any abridgment of his paper must mar its usefulness. The limited space at the writer's disposal precludes the reproduction of the entire paper, and the reader who may be specially interested in this subject is therefore referred to the original;

Soil.

each again, and that the floods inundate the land in spring tides, thus an-
nuring the soil and preserving its fertility. "The land is flat, having a slight
slope away from the river, there are a few points that rise above the gen-

received equal to dry 100

Soil dried at 212°F.

Alumina	6.09
Peroxide of iron	4.93
Lime	1.19
Magnesia	1.13
Alkalies (by difference and loss)	1.80
Silica solution	1.15
	12.29
	3.49
	5.66
	75.56
	100

The Sweet Oranges of Silhet.

CITRUS
Aurantium.

"It will be observed that this is a very siliceous soil, proceeding from the decomposition of siliceous rocks alone. It contains no carbonate of limes and is a very open and porous soil."

CULTIVATION—The seed is sown in January and February, thickly in troughs or boxes in about 6 inches of soil. These seed-boxes are raised at such a distance as to reach them and are often protected by nets

ORANGE PRO-
DUCTION IN
INDIACultivation.
1240

root. They are transplanted into a nursery in the grove; here they remain until retransplanted to their destined places in the grove. The system seems defective and the nursery is only once a year weeded, viz., in October. Grafting is quite unknown, and no care seems to be spent on the selection of the seed.

COLLECTION AND PRUNING—Each collector has a ladder, about 20 feet long, made of light bamboo. A coarse net bag, held open at the mouth by a cane ring, depends on his back by a strap passed over the right shoulder and chest. Into this he throws the oranges and before descending he removes the withered leaves and dead branches, or cuts out boughs injured by the loranthus parasite that does such damage to the plants. "The orange trees receive no other handling than the above, they are never systematically pruned or thinned, and are allowed to retain just what fruit they set, and yet the crop turns out wanting neither in size, flavour, nor abundance. Contrast with this the elaborate summer and winter pruning of the French gardens and the systematic cultivation and

Collection and
Pruning.
1241

the dogs have come by habit to relish this food.

TRANSPORT TO THE PLAINS—The oranges so collected are taken

Transport
1242

quarry are sold by collecting for rice, fish, &c., to the Muhammadan boatmen at R6 a son, being R4 less than the oranges at the Shalla groves, and yet this includes the cost of cultivation, labour of plucking, and carriage to the river.

TRADE IN SILHET ORANGES.

Mr G. Stevenson, Deputy Commissioner, Silhet, has furnished the following tabular statement.—

TRADE
1243

										BOAT TRAFFIC.	
										Quantity in maunds	Value in Rs.
1880-81	.	.	.	.	.	.	.	.	.	1,20,395	2,40,796
1881-82	.	.	.	.	.	.	.	.	.	1,46,592	not kn wn
1882-83	.	.	.	.	.	.	.	.	.	1,02,631	1,28,283
1883-84	.	.	.	.	.	.	.	.	.	1,14,969	2,27,062
1884-85	.	.	.	.	.	.	.	.	.	1,20,884	2,47,352

CITRUS
Aurantium.

The Sweet Oranges of Nagpur.

TRADE

Dr Bonavia, comm

about 1,21,095 maunds

of rupees, in favourable

to be equal to about 8

Bonavia further adds

small Taking 8,05,36c

low, the figures would be 2,41,60,800, or about 210 oranges to the maund"

Nagpur
1244

If —ORANGES OF NAGPUR IN THE CENTRAL PROVINCES—We have already given several passages that refer to the so-called wild oranges both of Nepal and the Central Provinces. It will only be necessary further to give here a brief account from the pen of Mr. J B Fuller, as published by Dr Bonavia, in order to place before the reader a comparative sketch of these groves to complete what has been said of the Khásia hills. These two localities represent the bulk of the orange production of India. Mr Fuller says — 'Within the last twelve years many new orchards have been planted in Nagpur, Kamptee, and other parts of the district, and orange cultivation is now spreading rapidly in other districts of the Province. There is a great demand for the Nagpur oranges in Bombay, and considerable quantities of the fruit are annually exported to this and other places. In the year 1885, 22,609 maunds of orange fruit were exported from Nagpur station, out of which 21,400 maunds were exported to Bombay alone."

re to repeat that the North-West Pro-
Nepal, Delhi, and to some extent also
and Burma are practically dependent
d orchards, Madras drawing largely

Properties and Uses—

GUM

1245

Gum —The orange tree is said to yield a gum of no importance. A sample was sent from Masulipatam to be shown at the Madras Exhibition in 1885.

MEDICINE
Rind
1246

Medicine —The *Pharmacopœia of India* treats the sweet and bitter

external applications

cel is useful for
Orange poultice

is recommended in some skin affections, such as psoriasis, &c. Oranges are considered to be alexipharmic and disinfectant, orange-water stimulating and refreshing. The essence is extracted by oil from the rind and flowers, and is used as a stimulating liniment' (*Dr Dy-mock, Urt Med W Ind*).

Ainslie makes the following remarks "Oranges are in great repute amongst the Hindu physicians, who suppose that they purify the blood,

C. 1246

The Bitter or Seville Orange

CITRUS
Aurantium.

allay thirst in fevers, cure catarrh, and improve the appetite. A sherbet Europeans made with the rind a valuable addition to bitter infusions in cases of dyspepsia and flatulence. The rind pulverised and added to magnesia and rhubarb affords a grateful tonic to the stomach in gout and dyspepsia. The roasted pulp is an

MEDICINE

FOOD
I247

grown in and about Delhi is on the average larger, but more spongy,

1200 The produce of one tree ranges from 500 to 6000 fruits a year, and the tree sometimes grows to a height of 50 feet, with a trunk 12 feet in circumference

Structure of the Wood —Yellowish white, moderately hard, close and even grained

TIMBER
I248

Var 2 Bigaradia, *Fl Br Ind*, I, 515 (For var 1st, see p 335 and for 3rd, p 347)

Botanical Diagnosis —Petiole short winged, flowers large, strongly scented, rind very aromatic, pulp bitter

Var 2
Bigaradia.
I249

THE BITTER OR SEVILLE ORANGE, BIGARADIFR, *Fr*; ARANCIO FORTE, *It*; POMERANZE, *Ger*

Syn —*C VULGARIS* Risso *C BUXIFOLIA*, *Poir*

Habitat —The bitter orange is very extensively grown in the warmer parts of the Mediterranean, especially in Spain and Malta. In India it does not seem to be cultivated except in gardens but it is believed by m Garhwal reas extends purely from

Marmalade is chiefly made from the rind of this species, but it is manufactured from the true rous bitter indigenous employed for grafting other oranges. Definite

Marmalade
I250

information cannot be obtained as to the extent the Seville orange is being cultivated in India

OIL OF NEROLI

Oil and Perfumery —Essential oils are obtained from most of the species of the Citrus family. Sir W OShaughnessy, speaking of the sweet

OIL
I251

C. I251

CITRUS
Aurantium.

The Bitter or Seville Orange.

PERFUMERY

1252

Bigarade, and the oil from the flowers of the sweet variety bears the name of *Essence de Néroli Pétale* or *Néroli Louce*. This statement is opposed, however, to the opinion given by almost every other writer, the neroli otto from the sweet orange being used only as an adulterant to that from the bitter. The fresh flowers of the *Bigaradia* orange yield on distillation *Essence de Néroli Bigarade*, and if the sepals are carefully removed from the flowers, the essence is known as *Essence de Néroli Pétale*. The latter is finer and much more expensive than the former. From the seeds *Essence de Petit Grain* used to be manufactured, but this is now entirely distilled from the *Essence de Petit* most species of

1253

orange leaf to annulate neroli otto. The water which passes over with the oil during distillation constitutes, when separated from the oil, *Orange-flower Water* (see below)

The extraction of Neroli oil is chiefly carried on at Grasse, Cannes, and Nice, in South France, also in Algeria. In France, about 20,000 cwt of the flowers are annually distilled. The sweet variety yields but half the amount of oil which may be obtained from the bitter, as much as

Neroli Cam-
pher
1254Eau de
Cologne
1255

1256

It are used to an enor-
and Eau de Cologne
" is mainly consumed

1257

among the distillers of essential oils. It is largely used in pharmacy. There are three sorts of orange-flower waters found in commerce. The first is distilled from the flowers, the second is made with distilled water

C. 1257

The Bergamot Orange.

CITRUS
Aurantium.

and neroli, and the third is distilled from the leaves, the stems, and the young unripe fruit of the orange tree." (*Piessé*) "As met with in commerce, orange-water is colourless or of a faintly greenish-yellow tinge, almost perfectly transparent, with a delicious odour and a bitter taste." (*Pharmacop*)

ESSENTIAL OIL OF ORANGE PEEL—"Largely made at Messina, and also the south of France. It is extracted by the sponge, or by the *écuelle* process, partly from the Bigarade and partly from the sweet or Portugal Orange, the scarcely ripe fruit being in either case employed. The oil made from the former is much more valuable than that obtained from the latter, and the two are distinguished in price-currents as *Essence de Bigarade* and *Essence de Portugal*.

"These essences are but little consumed in England, in liqueur-making and in perfumery." (*Pharmacog.*)

Var 3. *Bergamia*, *Fl Br Ind*, I, 515

THE BERGAMOT ORANGE

Syn — C AURANTIUM, var. BERGAMIA, W & A Prodr, p8; C LIM.

Var. 3
Bergamia
1258

ՀԱՄԿԱՅԻ, ԱՆ ԲԱՄ ԺԱՅԱՅԻ, ԵՄԵՄ

References—Brandis, *For Fl*, 54, *Dals & Gids*, *Bomb Fl*, *Supp*, 13,
Voigt, Hort Sub Cal, 142, *Pharm Ind*, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 83

Habitat—The Bergamot Orange is cultivated near Reggio in South Calabria, in Sicily, and in the south of France, but it is only rarely met with in India. It may be doubted how far the above vernacular names given to it are correct. The fruit, when full grown, is still unripe and green, they are sometimes known as green oranges. Some of the green oranges met with in India (and already alluded to, p. 340) may belong to this variety.

BERGAMOT OIL

Oil—The rind of the fruit yields on expression the oil known under the name Bergamot. For this purpose the fruits are used, and one hundred of them are said to produce about three ounces of the otto. Formerly the oil was extracted by distillation or by expressing the rasped rind, but these processes have been superseded by the *écuelle*, a special instrument described in *Spons' Encyclopædia*, page 1457.

General Characters of the Oil.—The oil, as produced by the machine

Chemical Composition—The authors of the *Pharmacographia* say: "If essential oil of bergamot is submitted to rectification, the portions

CHEMISTRY.
1260

C. 1260

CITRUS
decumana.

The Bergamot; The Pumelo or Shaddock.

CHEMISTRY

that successively distil over do not accord in rotatory power or in boiling point—a fact which proves it to be a mixture of several oils, as is further confirmed by analysis. It appears to consist of hydrocarbons, $C_{10}H_{16}$, and their hydrates, neither of which have as yet been satisfactorily isolated. Oil of bergamot, like that of turpentine, yields crystals of the composition $C_{10}H_{16} + 3H_2O$, if 8 parts are allowed to stand some weeks with 1 part of spirit of wine, 2 of nitric acid (sp gr 1.2), and 10 of water, the mixture being frequently shaken.

Properties and Uses—The oil of bergamot is much employed in perfumery. It has stimulant properties, but is rarely used in medicine. It is sometimes employed to give an agreeable odour to ointments and other external applications.

Essential Oil
1261

can be obtained

MEDICINE
Juice
1262

Medicine—The juice of the fruit possesses properties similar to those of lemon juice (see under *Citrus Medica*, var *Limonum*). It is often preferred to lemon juice, as the fresh juice can be readily obtained in nearly all parts of the tropics, and as the preserved lemon juice is less effectual. It is useful as a refrigerant drink in small-pox, measles, scarlatina, and other forms of fever. It may also be taken with advantage in cases of hæmorrhage from the lungs, stomach, bowels, uterus, kidneys, and other internal organs. (*Waring, Bizar Medicines*)

1263

Citrus decumana, Linn, *Fl Br Ind*, I, 516

THE SHADDOCK, PUMELO, or POMPELMOS, THE FORBIDDEN FRUIT, PARADISE APPLE, Eng, POMPELMOUSE, Fr, POMPELMOES, Sp

The word Pumelo is a contraction of "pomum melo," the melon apple.

Vern—*Maha nimbu chakotra batari nebu sadaphal* HIND, *Bāṭari nebu, mahā nimbu, chakotra bator nebu*, BENG, *Chakotra*, Pn, *Bjorv*.

References—*Fl*, 58, 572, *ice Citrus*
hurs For, *Supp*, 12,
Family in N, *Hort Sub*
Stewart, Pb, *Mat Med*
Cal, 141, *Fluck O liano, t narmu*, 2, 111, *Mat Med*
His id, 127, *O Shaughnessy Beng Dispens*, 232, *Dalen Lowell, Pb*
Pr, 334, *Cook Gums and Gum resins*, 13, *Atkinson Him Dist* 7104
Atkinson, Gums and Gum resins, 16, *Birlwood Bomb Prod*, 141, *Lis*

C. 1263

The Pumelo, The Citron

CITRUS
Medica.

boa, U Pl Bomb, 148, Smith Dict, 375 Treas of Bot Ure, Dict Arts and Manuf, III, 765 Kew Off Guide to the Bot Gardens and Arboretum, 64 65, Trop Agri, 117, Simmonds Trop Agri, 441

Habitat—A native of the islands of the Malay Archipelago, more particularly abundant in the Friendly Isles and Fiji. Introduced into India from Java and into the West Indies by Captain Shaddock, hence the name *Shaddock*. It is cultivated in most tropical countries. In India and Burma it is a common fruit tree. It is, however, more frequent in Bengal and Southern India than in the North-West Provinces. The vernacular name *Batavi nebu* suggests its having been originally brought from Batavia. "The fruit is very large, weighing sometimes ten to twenty pounds, roundish, with a smooth pale-yellow skin, and white or reddish sub acid pulp. When the fruits attain their largest size, they are called pompoleons, or sompilmousses, those of the smallest size form the 'Forbidden fruit' of all the English markets" (*Treasury of Botany*).

Gum—Said to yield scantily an unimportant gum. In 1855, Lieutenant Hawkes sent to the Madras Exhibition a sample of this gum (*Cooke*).

Medicine—Mr Baden Powell says that the FRUIT is nutritive and refrigerant. It contains sugar and citric acid, with much essential oil in the peel. The leaves are said to be useful in epilepsy, chorea, and convulsive cough.

Food—This tree is a favourite with the natives of India, as it gives fruit all the year round, flower unripe and ripe fruits may be seen on the same tree at once. There are two varieties, one with whitish, and the other with reddish pulp. Besides, the individual fruits differ from one another in size, shape, and colour.

—ference, and also in quality.
C Bonavia (in the paper to
"The best pummelows
vs of the Bombay market

GUM
I264

MEDICINE
Fruit
I265
Peel
I266
Leaves
I267
FOOD
I268

Citrus Medica, Linn, *Fl Br Ind, I, 514*

I269

may be found to be the mountain tracts of Eastern Bengal, more particularly of the Khásia and Garo hills, while the latter is of a more northern character, extending along the foot of the Himalaya to the Panjab

C. I269

CITRUS
Medica.

The Citron.

The sweet lime (*C. Limetta*) appears to be the southern manifestation of

frontier.

This species includes as varieties the Citron, the Lemon, the Sweet and the Sour Lime.

Var. 1. *Medica* proper.

THE CITRON, CEDRAT-TREE, ADAM'S-APPLE, *Eng.*; CEDRATIER, CITRONIER, *Fr.*; Cidrato, CEDRO, *It.*; CIDRO, *Sp.*; CIDREIR, *Port.*; CEDRATEN, CITRONENBAUM, *Germ.*

Considerable difference of opinion prevails as to the origin of the word Citron. It is presumed that the Median apple was synonymous with the

Syn.—*C. AURANTIUM*, var. *MEDICA*, *W. & A. Prodr.*; *C. MEDICA*, var. *A.*, *Linn.*; *CITRUS MEDICA*, *Risso*

Vern.—*Bijaura*, *limbu*, *kutla*, *bara nimbu*, *turanf*, *nimbu*, *limu*, *HIND.*

much resembles a small pumpkin.

C. 1270

Var. 1
Medica,
1270

The Citron; The Lemon.

CITRUS
Medica.

Captivity According to Gallezio it was introduced into Italy about the third or fourth century. The Jews cultivated citron when under the Roman rule, and used the fruit, as at the present day, in the Feast of Tabernacles; each person bringing a citron in his hand. Dr Royle found the species growing wild in the forests of Northern India, and, as already stated, it may therefore fairly be conjectured that the original home of the citron was in India. It has now spread over the whole of the civilised world, and even in cold regions it is cultivated under artificial heat.

Gum—Said to yield scantily an unimportant gum. Sent from Masulipatam to the Madras Exhibition in 1855.

GUM
1271
DIL
1272

(Pesse)

Medicinal—The dried rind of the fruit is used as a sedative (*Yerr. Book, Pharm.*, 1874, 623)

Special Opinions—§ "The rind is made into a marmalade and is an antiscorbutic" (*Surgeon-Major A. S. G. Fayakar, Muskat*) "It is made into preserve and is used for dysentery" (*Surgeon-Major J. Robb, Ahmedabad*)

Food.—The fruit is described in the *Flora of British India* as large, oblong or obovoid; rind usually warted, thick, tender, aromatic; pulp scanty, sub-acid. The rind makes good comfit, the pulp is also preserved in sugar. Both fruit and preserve are somewhat bitter to the taste. The rind of the fruit candied is well known as a delicate sweetmeat. Atkinson says the wild fruit is used for pickling (*khatāi*).

D-

n

l.

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lp "

Var. 2 *Limonum, sp. Risso.*

The word lemon is from the Arabic *limun* and is derived from the

MEDICINE.
Rind
1273
Pulp
1274
Seeds
1275
Leaves,
1276
Juice
1277
Marmalade,
1278
FOOD
Fruit
1279
Comfit,
1280
Candied Rind.

1203
TIMBER.
1284
DOMESTIC
1285
Var 2.
Limonum.
1286

birā nimbu or large *nimbu*.

The Citron; The Lemon.

CITRUS
Medica.

According to Gallesio it
Captivity third or
rule, and
nacles;
species

stated, it may therefore fairly be conjectured that the original home of
the citron was in India. It has now spread over the whole of the civilised
world. In cold regions it is cultivated under artificial heat.
Important gum. Sent from Ma-

GUM
1271
OIL
1272

(Pesse)

Medicine.—

SEEDS, LEAVES,
gent

According

To one who has taken a poison injurious to life, it may be given, producing
a violent action. It is drawn out. It also corrects
for of the fruit is used as a

an antiscorbutic" (Surgeon-Major A. S. G. Fayakar, Muskat) "It
is made into preserve and is used for dysentery" (Surgeon-Major
Robb, Ahmedabad)

MEDICINE.

Rind

1273

Pulp.

1274

Seeds.

1275

Leaves.

1276

Juice

1277

Marmalade.

1278

FOOD.

Fruit

1279

Comfit

1280

Food.—The fruit is described in the *Flora of British India* as large,
oblong or obovoid; rind usually warted, thick, tender, aromatic; pulp
scanty, sub-acid. The rind makes good comfit, the pulp is also pre-
served in sugar. Both fruit and preserve are somewhat bitter to the
taste. The rind of the fruit candied is well known as a delicate
sweet.

othe
they

Var. 2 *Limonum*, sp. *Rissa*.

The word lemon is from the Arabic *limūn*, and this, through the
Persian, is the Hindi *limbu*, *limbu*, or *nimbu*, probably adopted by the
Sanskrit people. Much stress is by authors laid on the

DOMESTIC

1285

Var. 2.

Limonum.

1286

CITRUS
Medica.

The Lemon.

THE LEMON, *Eng.*; CITRONNIER, LIMONIER, *Fr.*; LIMONE
It.; CITRONE, *Germ.*

Syn.—C. AURANTIUM, var. LIMONUM, *W. & A Prodr.*, 98; C. LIMONUM,
Wall Cat., 639; C. MEDICA, *Willd.* (according to *Roxb.*), *Fl Ind.*, Ed.
C B C, 590

Vern.—*and in English*

HURM, *Lokha-dehi*, *SING*
Reference

and Drugs, in As Kes, Vol XI, p 164

is highly probable the lemon is of much more recent origin than the citron
and the lime

The question has been recently raised as to the highest altitude
oranges and lemons could be grown in India. A writer in the Agri-
Horticultural Society's Journal said they could not be grown above
5,000 feet. Madden refers to the lemons grown at Almora, the fruit
being collected in summer and ripened in straw. The altitude given
above is perhaps correct for the Indian species generally.

History.—Dr. Royle is said to have found the tree growing wild
in the north of India, and Atkinson reports that Madden spoke of
the *jamsira* or wild variety found in the Kato District of India. Before
wild plants were known

De Candolle states that the
and Romans, and that its
conquests of the Arabs. On their spreading over the vast regions of
Asia and Africa, they spread it from the east to the west, and the
lemon. The latter was from the
gardens of Oman into writing

in the thirteenth century, very well describes the lemon which he had
seen in Palestine; and doubtless it was by the Crusaders first brought
from the

LEMON OIL.

HISTORY
OF THE
LEMON.

The Lemon.

CITRUS
Medica.Method of
extraction.
1288

in France. A brief account of the methods of extraction, as given in the *Pharmacographia* (p. 110), may be reproduced here:—

Sponge process.—"The workman first cuts off the peel in three thick longitudinal slices, leaving a little peel at either end in the middle, throwing it on one side."

The latter are allowed to dry for a few days. The workman then takes a piece of sponge, wrapping it round his fore-finger. With the other he places on the sponge one of the slices of peel, the outer surface downwards, then presses the zest side (which is uppermost), so as to give it for the moment a convex instead of a concave form. The vesicles are thus ruptured, and the oil which issues from them is received in the sponge with which they are in contact. Four or five slices are thus treated, each giving to each slice of peel, which done in this way, a small bit of peel has attached to it a small quantity of oil.

The workman then takes a small piece of cloth, and presses the latter, trying to avoid pressing the latter, the workman wrings it forcibly, receiving its contents in a coarse earthen bowl.

The oil thus obtained is of a pale yellow color, and has a faint lemon odor, about

equal to that of the lemon. It is then placed in a tube about an inch in diameter and five inches in length, closed at its lower end. This vessel, which is called an *écuelle à piquer*, has, therefore, some resemblance to a shallow, dish-shaped funnel, the tube of which is closed below. The workman takes a lemon in the hand, and rubs it over the chamber of the tube.

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CHEMISTRY.
1290

the foregoing boils at 176°C . Lastly, a small quantity of cymene and also in oil of lemons. The crude oil of lemons already yields the crystalline compound $\text{C}_{10}\text{H}_{16} + \text{Z HCl}$, when saturated with anhydrous

CITRUS
Medica.

The Lemon.

PERFUMERY
I291

hydrochloric acid . . . the sol
the sol
Prec . . .
a flav
combination with rosemary, cloves, and caraway, for perfuming powders for the nursery. From its rapid oxidation it should not be used for perfuming gloves or it becomes rather soft . . .

MEDICINE
I292

Valued as an antiscorbutic and refrigerant—primarily antialkalinic; secondarily, antacid. It forms the best remedy for scurvy, and an excellent drink in fever and inflammatory affections. It has met with success in acute rheumatism, dysentery, and diarrhoea. It also forms an antidote to acro-narcotic poisons. (*Pharm. Ind.*) Mr. Baden Powell says that it is considered by

In bilious
with port wine
Medica Iser^h
the relief
such as p . . . hip joints, &c.,
Saragadhiara recommends the use of lemon juice with *yarakshara* and honey (*V. C. Dutt*).

The best substitute for lemon juice is a solution of about eight drachms of citric acid in sixteen ounces of water, with the addition of a few drops of lemon oil. Lemon juice may also be used in preparing effervescent diaphoretic and diuretic draughts. The relative proportions of lemon juice and citric acid with the alkaline carbonates, for the formation of effervescent draughts, are as follow:—

Lemon juice—	or Citric acid—	to 20 grains of
℞ drs iijss	grs xiv	Bicarbonate of Potash,
℞ drs vi	grs xxiv	Carbonate of Ammonia,
℞ drs iv	grs. xvii	Bicarbonate of Soda.

The lemon juice, being liable to spontaneous decomposition, speedily becomes unfit for medical use. "One of the best methods of preserving the juice is to allow it to stand for a short time after expression, till a coagulable matter separates, then to filter, and introduce it into glass bottles, with a stratum of almond oil or other sweet oil on its surface. It will keep still better if the bottles containing the filtered juice be suffered, before being closed, to stand for fifteen minutes in a vessel of boiling water. Another mode is to add one-tenth of alcohol and to filter. The juice may also be preserved by concentrating it either by evaporation with a gentle heat, or by exposure to a freezing temperature, which congeals the watery portion, and leaves the juice much stronger than before." (*U S Dispens.*, 15th Ed., 849)

Dr. Charles Rice of New York states that the bark of the root has been used in the West Indies as a febrifuge and the seeds as a vermifuge.

The Lemon, The Sour Lime

CITRUS
Medica.

§ 'Lemons as well as other fruits of the same order, contain a principle—*hesperidine* By some chemists this substance is described as bitter and crystalline and by others as tasteless. *Glutamine* is found in orange pee

A glucoside
mana. (Sur

Citric Acid

It occurs in colourless crystals, is very soluble in water, less soluble in rectified spirit, and insoluble in pure ether. The chief use of citric acid in medicine is in the preparation of effervescent draughts and refrigerant drinks.

§
be s
and
(Sur,
L

are given for the preparation of this substance "Take of fresh lemon peel two ounces, lemon juice, strained, one pint, refined sugar, two pounds and a quarter Heat the lemon juice to the boiling point, and having until with should have the specific gravity 1.34"

Special Opinions—§ 'Lime juice—Most useful in dysentery with sloughing of the mucus membranes I have given 12 ounces a day in apparently hopeless cases with success" (From a Contributor) "Lemon oil mixed with glycerine is applied on the eruption of acne" (Surgeon R Gray, Lahore) Lemon juice and gunpowder used topically for scabies" (Surgeon Major E C Bensley, Rajshahye) 'The fruit in the form of pickle is useful in hypertrophy of the spleen" (Surgeon F C Penny, Amritsar)

Food—The lemon juice is used largely in sherbets and cooling drinks The fruit is also pickled

Var 3 acids.

THE SOUR LIME OF INDIA

Syn —C ACIDA R A M I J E S C H A -

Vern —*Lebu, nebu limbu nimba* I m - - - - -*limbu nimbu pats nebu**nebu BENG, Nimba**limbu GUJ, Limbu,**mich-cham-pasham, ele**pandu nimnapunda**jonatam naranna jerd**Jambira limbika, ni**Limun, linu-kemis**Thanbaya, samya si, tambya si BUXM Dehi, SINGH*

References—Brandis, For Fl 52, Stewart, Pb Pl, 29 DC Origin, Cult Pl, 179 U C Dutt Mat Med Hind, 226, Ainslie, Mat Ind, 1, 193 Atkinson Him Dist 710, McCann Dyes and Tans Bengal, 159 Rev Off Guide to the Museum, 25, Rev Off Guide to the Bot Gardens and Arboretum, 64

MEDICINE

Citric acid
1293Syrup.
1294FOOD
1295
1296

CITRUS
Medica

The Sour Lime.

Habitat—Wild in the warm valleys of the outer Himálaya, from Garhwal and Sikkim to the Khásia and Garo hills, Chittagong, and probably also the mountain tracts of the Central Provinces and of the Western Peninsula and the Satpura mountains of Central India. It

according to native gardeners. There are many minor cultivated forms, differing chiefly in size. The fruits of all are more or less round, smooth, with a shining rind, green, or only tinged with yellow when ripe.

Dye—The leaves of this plant are used in tanning in Mánbhum. This seems to be doubtful; at most, the leaves can be used only as an

inferior to a superior, it is beautiful to behold, cooling and fragrant to the smell, the juice of it rubbed upon the head will soothe the ravings of frenzy, and the rind of it dried in the sun has the power, when laid

swelling caused by musquito bites (*brigade surgeon f. n. in India, Monghyr*)

Food—The Sour Lime of India has "flowers small, fruit usually small, globose or ovoid"
U C Dutt says "The fresh juice, squeezed

and salt is a popular and effectual
by excess in eating, or by indigestible
rst rubbed over a stone, or their rind

from other fruits of the so
the addition of common s
are preserved in porcelai

on Jaunpur and Aza
value is the *patis nibu* or
ity, the *kamarali nibu*
vinces. The small sour
e, and the larger ones

Dr Bonavia remarks
They are to be found
everywhere, and even where no other Citrus occurs, some kind of
lime is sure to be seen. Nevertheless, it is astonishing that so common
a thing so useful a fruit, and a tree so easily raised from seed, is not to
be found in the *villages* of the North-West Provinces. There is probably

C. 1300

DYE
1297

MEDICINE
1298

FOOD
1299

Pickle
1300

The Sweet Lime, The Sweet Lemon.

CITRUS
Medica.

not a *village* in the whole of India where the *highz: nambu* would not readily grow" "Although they are called limes, I believe them to be an
of India "The call them *clasheta*

FOOD.

Var. 4. Limetta, W. & A., *Fl Br Ind*, I, p 515.

THE SWEET LIME OF INDIA

Syn — *C NOBILIS* Lour, as in Kurr, *For Fl Burm.*, I, 197, Wight
 Ic t 158 *C LIMETTA* Risso It might be asked has the *C LIMETTA*,
 Risso, sweet or bitter fruits? if the latter, it might be viewed as a synonym
 of var *acida*.

Vern — *Mitha nebu*, *nembá*, *mitha amrit phal*, HIND, *Mitha nebu*,
 BENG *Mita nambu*, PA, *Mitha limbu*, GUJ, BOMB *Elemitchum*,
 TAN, *Nemma pandu gajanumma*, TEL, *Erumitchi narracum*, MALA,
Madkutarkatika, SANS, *Thanbaya* BURM, *Dehi*, SING
 References — D J E F G H I K L M N O P Q R S T U V W X Y Z

1301

Habitat — Commonly cultivated in most parts of India and Burma.
 Most probably a native of Southern India, Wight says it is indigenous
 at Kolagberry in the Nilgiri hills

Botanic Diagnosis — Leaves with winged petioles, flowers small,
 white, fruit globose or ovoid, shortly mamillate, rind with concave
 vesicles

The limes approach much nearer to the true oranges than do any of
 the other forms of *C. Medica*. Indeed, it is difficult to say how far
 the published accounts of *C Limetta* have become mixed up with
C Bigaradia, and the vernacular names given to both these forms, as

preceding variety.

Var. 5. Lumia, W & A., *Fl Br Ind*, I, 515

THE SWEET LEMON, Eng., LUMIE, Fr. & Germ.

Vern — See *C LIMETTA*MEDICINE
1322
FOOD.
1303

1304

Botanical Diagnosis — Leaf petioles simply margined, flowers tinged
 with red, fruit bright yellow, ovoid oblong, with a long curved mamilla,
 rind with convex vesicles, pulp sweet.

C 1304

CITRUS
Medica.

The Sour Lime.

Habitat—Wild in the warm valleys of the outer Himálaya, from Garhwal and Sikkim to the Khásia and Garo hills, Chittagong, and probably also the mountain tracts of the Central Provinces and of the Western Peninsula and the Satpura mountains of Central India. It

is distinguished as the large lime, but this is the lime itself in its minor cultivated forms, more or less round, smooth, with a shining rind, green, or only tinged with yellow when ripe.

Dye.—The leaves of this plant are used in tanning in Mánbhum. This seems to be doubtful; at most, the leaves can be used only as an adjunct to the tans, imparting an odour to the leather.

Medicine.—"Lime-juice is much used in medicine by the native prac-

DYE.
1297

MEDICINE.
1298

FOOD
1299

Monghyr).

Food—The Sour Lime of India has "flowers small, fruit usually small, globose or ovoid. U. C. Dutt says: "The fresh juice, squeezed

Pickle
1300

with lime and salt is a popular and effective remedy for indigestion, by excess in eating, or by indigestible food. The fruit is first rubbed over a stone, or their rind is removed, and they are then steeped in juice obtained from other fruits of the sort, and exposed to the sun for a few days with the addition of common salt. When crisp and of a brown colour, they are preserved in porcelain vessels or glass jars. This preparation is

Atkinson's "Lime Pickle" is prepared in the same manner. Atkinson's "Lime Pickle" is prepared in the same manner. Atkinson's "Lime Pickle" is prepared in the same manner.

The small sour lime is the larger ones.

Booy's remarks on the larger ones of the Sour Lime are on to the larger ones.

The Sweet Lime, The Sweet Lemon.

CITRUS
Medica.

FOOD.

1301

Var. 4. Limetta, W. & A., *Fl Br Ind*, I, p 515.

THE SWEET LIME OF INDIA.

Syn—C NOBILIS Lour, as in Kurr, *For Fl Burm.*, I, 197, Wight
lc, t 558 C LINETTA, RISSO It might be asked has the C LINETTA,
 RISSO sweet or bitter fruits? if the latter, it might be viewed as a synonym
 of var acida

Vern—*Mitha nebu*, *nembā*, *mitha amrit phal*, HIND, *Mitha nebu*,
 BENG *Mitha nimbu* PN, *Mitha limbū* GUJ, BOMB, *Elemitchum*
 TAM; *Nemba pandu*, *gojanimma* TEL, *Erumitchi narracum*, MALA,
Madhukarkatika, SANS, *Thandaya* BURM, *Dehi*, SING

Habitat—Commonly cultivated in most parts of India and Burma.
 Most probably a native of Southern India, Wight says it is indigenous
 at Kolagberry in the Nilgiri hills

Botanic Diagnosis—Leaves with winged petioles, flowers small,
 white, fruit globose or ovoid, shortly mamillate, rind with concave
 vesicles

The limes approach much nearer to the true oranges than do any of
 the other forms of C. Medica Indeed, it is difficult to say how far
 the published accounts of C Limetta have become mixed up with
 C Bigaradia, and the vernacular names given to both these forms, as

y of

340

bilis

hers

ce "

(Surgeon & C Lenny, *Amritsar*)

Food—The fruit is both eaten fresh and after being preserved or
 cooked in various ways, but the juice is not so much valued as that of the
 preceding variety

MEDICINE

1302

FOOD.

1303

Var. 5 Lumia, W & A. *Fl Br Ind*, I, 515

THE SWEET LEMON, Eng.; LUMIE, Fr. & Germ.

Vern—See C LINETTA

1304

Habitat—This form is very little known in India, and occurs only occa-
 sionally in gardens It is probable that, with the lemon, this is not an Indian
 form Atkinson and many Indian writers use the terms "sweet lime"
 and "sweet lemon" as synonymous

Botanical Diagnosis—Leaf petioles simply margined, flowers tinged
 with red, fruit bright yellow, ovoid oblong, with a long curved mamilla,
 rind with convex vesicles, pulp sweet

CLAUSENA
indica.

The Mandarin or Maltese Orange.

OIL.
1305

Essential Oil.—Dr. Rice says that this oil is prepared at Squillace in Calabria by mechanical means.

1306

Citrus nobilis, Lour.

THE MANDARIN ORANGE, sometimes also called the MALTESE ORANGE

Syn.—CITRUS CHINENSIS and C. MARTIFOLIUS

Vern.—Probably the same as for C. LIMETTA; it is the *kán* of China

Habitat.—Cultivated in China and Cochín-China, where it appears to

1307

has been greatly ext
the blood oranges of
gardens at the begir
tifully in Sicily andBotanical Diagon
face, spherical but
yellow, pulp almost blood red with a peculiar flavour, both leaves and
fruit have the same odour.ENCOURAGE-
MENT OF
CULTIVATION
IN INDIA.

1308

sour, and juicy lemon known in the Kanjar as *guguz*; and that Bombay should prepare to meet the Indian demand for its excellent pomelos. In this way, with extended railway communication, free interchange might be made with the various provinces and a more constant and uniform supply; stricting th
which they
thoroughly
grow up conversant with the best modes of dealing with it, not only with regard to the cultivation and propagation, but also with the best modes of packing and preserving the fruit for a long time."

CLAUSENA, Linn.; Gen Pl, I., 304

1309

Clausena indica, Oliv.; Fl. Br. Ind, I., 505, Beddome; RUTACEÆ.

Syn.—PISTOSTYLIS INDICA, Dals.; Dals. & Gibs, Bomb. Fl., 29; BER-
GERA NITIDA, TAW, Flum. Ceylon Fl., 41.Vern.—*Migong-karapuchi-gass*, SINGA

Reference.—Lubbock, U. Pl. of Bomb., 33.

C. 1309

Ergot of Rye.

CLAVICEPS
purpurea.

Habitat — A shrub or small tree, met with in the Western Peninsula from the Bombay Ghats to the Anamally Hills, and also in Ceylon
Structure of the Wood. — Close-grained and hard, adapted for the lathe.

Clausena pentaphylla, DC, *Fl Br Ind*, I, 503

Syn — *AMYRIS PENTAPHYLLA*, Roxb & *Fl Ind*, Ed CB C, 321

Vern — *Rattanjoote, surymukha, teyrur*, HIND

Defences — D. J. P. F. C. L. H. T. A. C.

TIMBER
1310
1311

CLAVICEPS.

Claviceps purpurea, Tulasne, FUNGI

THE ERGOT OF RYE, HORNED OR SPIKED RYE (*Secale Cornutum*), BUNT

Syn — *SCLEROTIUM CLAVUS* DC. *ERGOTETIA ABORTIFACIENS*, Quek.,
OIDEUM ABORTIFACIENS, Berk & Br

References — *Pharm Ind*, 251, O'Shaughnessy, *Beng Disp*, 631, 673,
76, Balfour, *Agri Pests of India*, 61, 115, *Fleck & Hanb*, *Pharma*
cos, 740, *Bentl & Trim*, *Med Pl*, IV, 303, *U S Dispens*, 15th
Ed., 5567

Dr R Tytler (in the *C. I. Med. Di. & Tr. = R. and V. A. 111*)
reports that barley in
a disease very similar

MEDICINE
Leaves
1312

1313

produced within the paleæ of the common rye, *Secale cereale*, forms the
official part "In medicinal doses ergot acts principally upon the mus-

MEDICINE.
1314

tids, from the uterus

"In overdoses ergot produces nausea, vomiting, colicky pains, head-
ache, and sometimes delirium, stupor, and even death Taken for a
long time as a blood medicine it acted as a powerful agent

CLAY.

Ergot of Rye Clay

1315

seem of good quality but which contain a fungus, most probably an ergot. It seems probable that Indian wheat rust may be due to a species of *Æcidium* reared on a *Euphorbia*.

1316

Some writers have attributed to an ergot the poisonous qualities which *kesari* (*Lathyrus sativus*) is said to possess. An indulgent use of this produces a paralysis of the lower limbs which is generally incurable. See under Fungoid Pests.

CLAY.

1317

Clay is a hydrated silicate of alumina, which is expressed in mineralogy by the formula $11_2 Si_2 O_5 + 11_2 O$ which may be said to be $Si O_2$ 46.40, $Al_2 O_3$ 39.68, Water 13.92.

Vermiculite and other names — *Fe Ti Ca Mg Cl alkali*

Properties and Classification — The pure clay, defined above, when it occurs, is fine, however, clay, shale, or these would, or less clay on, the peculiar superficial deposits in river-basins, estuaries, or dried up lakes. Pure clay is derived from a decomposition of felspar, from which the silicates of potash, soda, &c, have been washed out. The purer forms of clay are

the former makes red clays, and the latter dark or even almost black. The former is rich in iron, and the latter in silica, and the former is termed "clay."

These facts naturally lead to an industrial classification of the clays, and in dealing with those met with in India we shall, as far as possible, take them up in the alphabetical order of their better known names in preference to attempting a scientific assortment.

I.—BRICK CLAYS

1318

In the early part of the present century, it was thought necessary to import bricks into India from England. It was soon discovered, however, that in almost every district clays suitable for this purpose existed.

C. 1318

Brick-Clay.

CLAY.

abundance, for bricks were employed in many buildings in India long anterior to the arrival of the English. Some of an enormous size are found in the ancient monuments, and in more recent times others much

is to blame. Of course there are some clays so impregnated with lime as to be valuable to the manufacture of the large rivers from these impurities at Akra near Calcutta, which is sold out annually. India see the Rurki

II—EDIBLE AND MEDICINAL CLAYS AND FULLER'S EARTH.

1319

In most bazars in India a fine unctuous or oily clay is sold as a drug or as an article of food eaten by *enceinte* women, or used by ladies as a cosmetic. Allied to this is the clay used to effect caste markings on the forehead. Balfour says such a clay "is excavated from a pit near Koluth in large quantities, and exported as an article of commerce,

Manipur, which he was informed was regularly eaten by the women

Multani.
1320

further comments on an imported earth known as *jang-i-dusti* (a Persian name). "This is generally imported from Bassorah and the Persian Gulf, as its name implies. It is used in tonic preparations and in irregular menses and with benefit from the iron it contains." He states that the earth in question is a silicate of alumina with lime and iron. U. C. Dutt (*Sans. Mat. Med.*) after dealing with red and yellow ochre (which see) or the *geru mafi* in Beng., and *gairika* in Sans., adds: "besides *gairika* several other varieties of earth are described

for relieving breeding from internal organs. It thus earth be a natural product of Surat it is nowhere (so far as the writer can discover) de-

CLAY.

Eddible Clay.

the source of a product may be inferred from its name. Under his

1321

1322

1323

which bore the name of *gagnî* or *garî*; the shop-keeper could, however,

as indicat-

il or quasi-

are most

oned earth

'Fuller's

570) gives

pposition

r's earth.

His account is of so much interest that we may reproduce here the main facts from it. "Being of detrital origin fuller's earth does not possess

Sabun Mitti.

1324

1325

1326

ong in the Bhagalpur
al mitti, a comestible

earth, the precise source of which is not known.

Ajmir

itions that fuller's

Over 2,000 camel-

Fire Clay

CLAY.

Bombay and Sind—A pale greenish clay is found in Western Sind, which is used for washing, and is also eaten by pregnant women.

Panjāb—Dera Ghazi Khan and Multan already alluded to, in the Salt range at Nilawan, Mr. Wynne says a lavender-coloured clay is found which is used as a fuller's earth.

III.—FIRE CLAYS.

These derive their name from their refractory nature—that is to say, they resist to great or high temperatures without fusing.

lays
or
Iq
ider-
and
that
of 11

I329

clays are procurable at Streepermatoor, Tripasoor, Cingieput, Mitulapoliham, and Cuddapah, indeed, are very common in many parts of India, and bricks can be made that resist the action of great heat. A clay found at Bey pore, 20 to 30 feet below the surface, is used for fire-bricks and for

I331

as follow —

"(1) First experiment in September 1874 by Theodore W. H. Hughes, Esq., F.G.S., A.R.S.M., Officiating Deputy Superintendent, Geological Survey, India.

"The fire-bricks tested by me were furnished by the firm of Messrs Burn and Company. The materials from which they are made are very refractory and capable of resisting high temperature, without sensibly fusing. That, compared with Stourbridge fire-bricks, they are somewhat superior.

C. I331

CLAY.

Pipe Clay.

Whitelaw, Manager of the Bengal Iron Company's proposed works and others, who agreed in the favourable estimate formed of the quality of these bricks.

"In addition to the foregoing we beg to quote you the opinions of D. W. Campbell, Esq., Locomotive Superintendent, East Indian Railway, and J. Blackburn, Esq., Engineer and Manager of the Oriental Gas Company. The former, in a letter to us, dated 23rd February 1875, writes:—

"(2) I have had the fire-bricks and fire-clay tried here, they are both very good; I will send you a requisition as soon as present stock is exhausted."

"And Mr. Blackburn, in his letter of 2nd March 1875, states as follows —

"(3) The Gas retorts made for the Company by your firm two years ago have since been kept in constant use at a temperature of about 2,000° Fht, and they have been found fully as durable and effective as those of the best English manufacture."

"We trust that the above extracts will be found to contain the information required by Dr. Watt for the Dictionary of Economic Products, but in case he wishes to analyse the clay himself, we have pleasure in sending herewith a few sample pieces obtained from the coal measures of the Raniganj District."

IV.—PIPE CLAYS.

This is known as *Namam* in Tamil and *Khanna* in Dukhni; its English name is taken from the fact of its being used to manufacture tobacco-pipes. It much resembles China-clay, only that it possesses more silica. Balfour says "This is found in abundance in several parts of India, the Hindus employ it for making the distinguishing marks on their foreheads, and (moistened with water) it is often applied

between Terany and Kauray in Trichinopoly.

V.—POTTERY CLAYS.

These might be popularly referred to three sections or degrees of purity: (a) porcelain or kaolin clays, (b) ordinary white or glazed pottery clays, and (c) red or tile and flower pot clays. In every province, indeed in almost every district of India, one or other of these

Pottery Clay.

CLAY.

Bengal, is attempting to compete with European imported articles

glazed pottery is less known than is the case in many parts of India. Mr. Kipling (*Journal of Indian Art*) says: "No substance resembling the fine clays of Dorsetshire, Devonshire, and Cornwall, is known to the

social status, no craft, excepting, perhaps, that of the leather-dresser, is held in lower esteem than the potter's trade in Hindustan, the Deccan, and South India." Mr. Kipling next distinguishes the two classes of workers in earth, *viz.*, *Kumhars* and *Kashigars*. The former are the common village potters who "produce wares which, though of little technical value as pottery, and of small commercial importance, are often good in colour and form, and perfectly fitted for the purposes they are intended to serve." The latter, the *Kashigars*, are "makers of glazed earthenware who are only to be found in the Panjáb and in Sind, and within the last few years in the town of Bombay and at Khurja in the North-Western Provinces. The name of the trade is Persian, derived probably from

into India by the Mussulman invasion, and not by means of the friendly intercourse which there seems reason to believe subsisted at various times with Tibet and the further East." Sir George Birdwood (*Indian Arts*)

CLAY.

Pottery Clay.

par and kaolin are obtainable in different parts of the district." "In the South Arcot district a fine plastic clay occurs in the Cuddalore beds near the south bank of the Guddalum," but it contains small quantities of lime and iron, the latter giving it a pinkish tint. In North Arcot the granite rocks of the district are decomposed to a certain extent, and, according to the report of the Government geologist, afford a considerable supply of pottery clays which enjoy some reputation, but are not abundant in the district of Chingleput, more especially at Sriperumatur. From the beds exposed at Coopum a supply has been taken for the Madras School of Art.

1335 *2nd, Mysore.*—For many years it has been known that kaolin earth occurs in the hills near Bangalore. It has been sent from

1336 *3rd, Mangalore.*—As early as 1811 Dr. Christie discovered, in association with the laterite, an extensive deposit of what he conceived to be pure porcelain clay.

1337 *4th, Bengal.*—In Orissa white clays occur in the Mahanadi valley of Rajmahal age. These clays are used by the natives for ornamenting

suitable for the manufacture of many articles of hard pottery, and which, with proper treatment, would afford suitable material for fire-bricks. But the best known clays of this series are the refractory and other clays now being worked by Messrs. Burn and Co. of Raniganj. The

1338

1339

1340 *7th, Assam and Burma.*—Rich deposits of porcelain clays have been reported to occur in Upper Assam near the Bhramakhund, known locally as *rukmanipitha*, and a fine clay for pottery purposes is also said to be found near the base of the cretaceous rocks at the western end of the Garo hills. In Burma the ordinary alluvial clay, mixed with sand, affords the material for common pottery, but a dark-coloured seam in the Irawadi valley is much sought after by the potters. Some of the upper beds in the nummulitic group are said to consist of China clay and would answer

Glazing and Colouring Pottery.

CLAY.

well for pottery, owing to their freedom from iron. Kaolin is also reported to exist in Tenasserim. Of the clays experimented with by Sir William O'Shaughnessy that from Singapore was said to be the best.

VI.—MATERIALS USED FOR GLAZING OR PAINTING POTTERY IN INDIA.

1341

The indigenous art of glazing pottery, as practised in India is crude and unsatisfactory. Ball says "The varnish or imperfect glaze used for the sugar-boilers' pans, known in Bengal as *kolas*, is thus described by Mr Piddington. There are two kinds of earth used, one of which is called *balutti*, it is a silicious and ochreous earth, the best being found at

use, the p
Uporomi,
20 miles
Kulna

obtained from one maund of the earth, two varieties of the *uporomi* are

of lime. The black colour of pottery is often obtained from the smoke of oil-cake thrown into the kiln when the baking is complete. At other times an organic varnish is used for this purpose, except when, as mentioned in connection with Azimgarh, the clay itself contains the necessary organic matter to cause it to burn black. Artificially blackened pottery is produced at Monghir, Patna, Sarun, Chunar, and Surat. In the younger rocks of the Rajmahal series certain clays occur called *khari*. These are used as pigments. According to Buchanan the potters of Rajmahal use this *khari* for giving a white surface to pottery made of ordinary clays. Cheap pottery is often painted after having been baked, such as that seen at Kota, Lucknow, Benares, &c., at other times it is powdered with mica, or by other mechanical means has a colour imparted to it. Black pottery is, for example, often etched, and a preparation of tin and mercury rubbed into the patterns in imitation of metal baidri ware. With the exception of these miserable attempts the *kumhar*

1342

1343

the material is put into a furnace until it melts, when clean-picked *shora*

C. 1343

CLEIDION
javanicum.

Glazing and Colouring Pottery,

1344

kalmi or saltpetre is stirred in. A foam appears in the surface, which is skimmed off and set aside for use. The latter is similarly made of quartzose rock and borax or siliceous sand and soda. "A point is made of firing the furnace in which the *kanch* is melted with *kakar*" (*Acacia arabica*)
 oxides
 of the *l*
sikka s
 made b
 reducin
 reducing with zinc instead of tin, *sikka lal* in the same way, oxidising

been roasted and powdered, mixed with a little powdered flint. Sir
 of the deep blue another grade of *nila* or indigo
 3 flint 4 parts
 5, zinc 5, and

1345

The yellow glaze used as the basis of the greens is made of *sikka sard*, white oxide 1 seer, and *sang safed* a white quartzose rock or mill stone, or burnt and powdered flint, 4 chittaks, to which, when fused, 1 chittak of borax is added.

1346

"The green colours produced are (1) *Zamrud*, deep green (1 seer of glaze and 3 chittaks of *chihul tamba* or calcined copper), (2) *Siba*, full by smaller
 urning 1 seer
 George Bird-

wood, in his most interesting account of Indian pottery, after having described the glazes and colours used proceeds "The colours after being reduced to powder, are painted on with gum or gluten. The vessel to receive them is first carefully smoothed over and cleaned, and, as the pottery clay is red when burnt it is next painted all over with a soapy, whitish engobe, prepared with white clay and borax and *Acacia* or *Anogeissus* gums called *kharya mutti*. The powdered colours are ground up with a mixture of *nashasta*, or gluten and water called *mawa*, until the proper consistence is obtained when they are painted on with a brush. The vessels are then carefully dried and baked in a furnace heated with *ber* (*Zizyphus*), or, in some cases, *Capparis* wood."

1347

VII—CLAYS OR EARTHS EMPLOYED AS PIGMENTS
OR DYES

See "Pigments" for further information as to colouring of pottery

Clearing Nut, see *Strychnos potatorum*, Linn., LOGANIACEÆ

CLEIDION, Blume, Gen Pl, III, 320

1348

Cleidion javanicum, Bl., Fl. Ind., V, 444, EUPHORBIACEÆ

Syn.—*ROTTLEA URANDA* Dals & Gibs Bomb Fl, 230

Vern.—*Okérégass okuru*, Sing

References.—*Kurs For Fl*, Burm, II, 300, Beddome, Fl. Syl., t. cclxxii, Gamble Man Timb, 348, Thwaites, En Ceylon Fl, 272, Lisboa, U Fl Bomb, 123

C. 1348

The Clematis.	CLEMATIS grata
Habitat — An evergreen tree met with in the tropical forests of North- rather heavy, durable in	TIMBER. I349
[EUPHORBIACEÆ.	
CLEISTANTHUS, <i>Hook f. Gen Pl, III, 268,</i>	
Cleistanthus malabaricus, <i>Mull-Arg, Fl Br Ind, V, 276</i>	I350
References — <i>Gamble, Man Timb, 357 Lisboa, U Pl Bomb, 120</i>	
Habitat — A small tree found in the Konkan and Malabar districts of South India	TIMBER I351
Structure of the Wood — <i>Lisboa</i> mentions this plant amongst his use- ful timbers	I352
C. myrianthus, <i>Kurz, For Fl Burm, II 370, Fl Br Ind, V, 275</i>	
Vern — <i>Mo man tha</i> BURM	
Reference — <i>Gamble Man Timb, 357</i>	
Habitat — A moderate sized evergreen tree of the tropical forests of Burma and the Andaman Islands	TIMBER. I353
Structure of the Wood — Moderately hard, reddish grey Weight 41 lb per cubic foot	
CLEMATIS, <i>Linn, Gen Pl, I, 3</i>	
Clematis barbellata, <i>Edgew, Fl Br Ind, I, 3, RANUNCULACEÆ</i>	I354
Reference — <i>Gamble, Man Timb, I</i>	
Habitat — A woody climber of the western temperate Himalaya, Garhwal, and Kumaon	
C. Buchananiana, <i>DC, Fl Br Ind, I, 6</i>	I355
References — <i>Kurz, For Fl Burm, I, 17 Gamble, Man Timb, I, Royle Ill Him Bot, I, 51</i>	
Habitat — A large woody climber, occurs throughout the temperate Himalaya at 6,000 feet	
C. Gouriana, <i>Roxb, Fl Br Ind, I, 4, Wight, Ic, t 933 4</i>	I356
References — <i>P. & H. Ind Fl CRC, t. 1, p. 11, f. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100</i>	
<i>Balfour, Cyclop</i>	
Habitat — An extensive climber found in the hilly districts from the Western Himalaya, rising up to 3000 feet, to Ceylon and the Western Peninsula	MEDICINE. Leaves. I357 Stems I358
C. grata, <i>Wall, Fl Br Ind, I, 3</i>	I359
Vern — <i>Ghantsuli, biberi</i> , HIND	
References — <i>Gamble, Man Timb, I, Voigt, Hort Sub Cal, 2, Royle, Ill Him Bot, I, 44, 45, 51, Balfour, Cyclop</i>	

CLEOME
VISCOSA

Wild Mustard

Habitat—A climber of the sub-tropical and temperate Himalaya at 2,000 to 3,000 feet

1360 *Clematis montana*, Ham, Fl Br Ind, I, 2

Vern—Ghantidh, HIND

References—Gamble, Man Tsb, I Royle, Ill Him Bot I, 45, 51

Habitat—A woody climber of the temperate Himalaya, from the Indus to the Bramaputra ascending to 12,000 feet, always above 8,500 in Sikkim, and in the Khasa Hills, Manipur, above 4,000 feet

1361 *C. napaulensis*, DC, Fl Br Ind, I, 2

Vern—Pawanne birri, wandok, PB

References—Stewart, Pb Pl 3 Royle Ill Him Bot, 23

Habitat—Found in the temperate Himalaya from Garhwal to Bhutan

Medicine—In Kanawar the LEAVES are said to act deleteriously on the skin

MEDICINE
Leaves

1362

1363

C. triloba, Heyne, Fl Br Ind I, 3

Vern—Moravela, moriel, moriel, ranjae, ranjai, BOMB, Moravela, MAR

References—Dals & Gbs Bomb Fl, I Dymock, Mat Med W Ind, 2nd Ed 21, S Arjun Bomb Drugs 2

Habitat—An extensive climber met with in the mountains of the

MEDICINE
Plant

1364

FIBRE

1365

Distillate

1366

CLEOME, Linn, Gen Pl I, 105, 968

Cleome pentaphylla, see *Gynandropsis pentaphylla*, DC, CAPPARIDEE

1367 *C. viscosa*, Linn, Fl Br Ind, I, 170 Wright, Ic, I 2

Sometimes called WILD MUSTARD

Syn—*C. ICOSANDRA* Linn *POLANISIA VISCOSA*, DC, P ICOSANDRA, IV & A

Vc—*Visca* HIND, *Tinmau* Ka fod, *jangli kul* AM, *Kuka* ALA, *Naya* ina-b urdara

References—Roxb Fl Ind Ed CBC 501 U C Dutt Mat Med Hind 259 Dymock Mat Med W Ind 2nd Ed 61 Ainslie Mat Ind II 223 O Shaughnessy Beng Dispens 206 Murray Pl and Drugs Sind 52 Drury, U Pl 351 Baden Powell Pb Prod 330, Cooke Ols and Outcrops 37 Atkinson, Him Dist 732, B rdwood

C. 1367

or Hurhur

CLEOME
VISCOSA.Bomb Pr, 276 Lisboa, U Pl Bomb, 145, Spens Encyclop, 1415
Balfour, Cyclop

Habitat—A common weed throughout the greater part of India, appearing in the rainy season, very common in Bengal and South India.

Oil—The seeds yield a light olive-green coloured limpid oil when subject to a great pressure. It seems likely that this oil would prove serviceable where a very liquid oil is required. The oil could be prepared to any extent.

Medicine—The juice of the leaves is poured into the ear to relieve ear-ache. According to Rheede, it is useful in deafness. Dr Dymock writes that the juice mixed with oil is a popular remedy in Bombay for purulent discharges from the ear, whence the Bombay name of the plant *Kanphuts*. "The LEAVES boiled in *ghis* are applied to recent wounds, and the juice to ulcers" (*Drury*). In Cochin China the whole plant, bruised,

OIL
1368MEDICINE
Juice
1369Leaves
1370Seeds
1371

to relieve ear-ache and as an astringent in cases of atorrhœa the ear should be syringed well before its application" (*Brigade Surgeon J H Thornton, Monghyr*). "Alterative, useful in secondary syphilis and enlargement of the liver and spleen" (*Surgeon-Major J McD Houston Travancore, and John Gomes, Esq, Medical Storekeeper, Trevandrum*). "The seed made into chutney has strong digestive power" (*Native Doctor Unmegudien, Mellapolliam, Madras*).

"The seeds of *Cleome viscosa* are anthelmintic, rubefacient, and vesicant, and the leaves rubefacient, vesicant, and a useful remedy for a few diseases of the ear. The seeds are valuable in expelling round worms, and also as a rubefacient and vesicant in all the complaints in which mustard is used. The leaves are also useful in the same way as a local stimulant, and, in addition to this, the juice possesses a curative influence over some cases of otalgia and otorrhœa, but the smarting it produces in

according to their age. As a drug the leaves of *Cleome viscosa* are much superior to those of *Gynandropsis pentaphylla*. It is the former which possess a distinct fetid smell and efficient rubefacient and vesicant properties, and not the latter. The above plants are frequently found growing together and are often confused partly from a general botanical similarity between them, and partly on account of their native synonyms being almost the same. The close similarity of their seeds adds greatly to this confusion. There will be, however, no difficulty in

CLERODENDRON
inermis

A Mild Antiperiodic

MEDICINE

distinguishing the two plants if due attention is paid to the following botanical characters —

'*Cleome viscosa* — Siliqua flat, striated, pubescent, and sessile or short stalked, flowers yellow, stem and branches quite covered with viscid

strongly

"As the seeds of both of these plants are very similar, I need not describe them separately. They are as follows: small, flat, and slightly acid or bitterish in taste. They yield a small quantity of fixed oil on expression."

remedial value' (Honorary Surgeon Mooden Sheriff, Khan Bahadur, Triplicine Madris)

Food — The SEEDS of *Cleome viscosa* are much used by the natives, chiefly the Brahmans, in their curries, they are sold in all the bazars at a trifling price (Rové) Lisboa says that the PLANT is eaten boiled with chillies and salt as salad

CLERODENDRON, Linn. Gen Pl, II, 1155

This name alludes to the variable properties of the species *kleros*, lot, and *dendron*, a tree

[VERDENACEÆ

1374

Clerodendron Colebrookianum, Walp., Fl Br Ind, IV, 594,

Vern — Aadungbi LEPCHA

Reference. — Gamble, Man Timb 299

Habitat — An evergreen shrub with silvery grey bark, met with in Sikkim and the Khasia Hills, 2 000 to 6 000 feet also in Burma

Food — The young LEAVES are eaten by the Lepchias

Structure of the Wood — Grey, soft

C. inermis, Garin Fl Br Ind, IV, 586

Syn — VOLKANERIA INERNIS Linn

Vern — Sang-kuppi sang k pi la i jaz, HIND Bun jumai, bun joi bon

11 MAR 1

m ki ppi,

viscous

ka eru

Pirolas

Reference — L. L. F. 22 Fl Br Ind, IV, 586

Habitat — A large, ramous often scandent evergreen shrub, common in tidal forests in Bengal, Burma, and the Andamans

Perfumery — An exquisite perfume is said to be derived from the flowers of this plant (Pisse)

Medicine — Dr Dymock says that the PLANT has a reputation as a febrifuge in remittent and intermittent fevers. This fact is supported by Dr Sakham Arjun, who, upon the authority of Dr Hojel, states that

C. 1379

PERFUMERY

1378

MEDICINE

Plant

1379

FOOD

1375

TIMBER

1376

1377

A Substitute for Chiretta

CLERODENDRON
infortunatum

"the thick succulent leaves are very bitter, and on expression yield a large quantity of thickish somewhat mucilaginous juice with a slightly saline but intensely bitter taste. Although not generally known, it has of late been used as a febrifuge and antiperiodic with marked benefit."

[Wight, *l.c.*, 1471Clerodendron infortunatum, *Garlin, Fl Br Ind, IV, 594.*

1380

Syn —VOLLAERIA INFORTUNATA, *Roxb, Fl Ind, Ed C B C, 478, G VISCOSUM, Vent*Vern —*Bhant bhat* HIND, *Bhant, glentu* BENG, *Kharbari, barni* or *varni* SANTAL, *Kula narsal* KOL, *Chitu* NEPAL, *Adung, LEPCHA,* *Likunah, MECHI,* *Kuli bas di* PO, *Kari BOMI* Bhandira, *kari,* *MAR, Bockoda TEL, Peragu MALA* Bhandira, *bhanti bhi staka,* *SANS, Ka aunggyi, bujiphyá, khaung gyi* BURM, *iGas pinna, SING*References —*Brandis For Fl 363, Kura For Fl Burm, II, 267,*74. *S. Arjun*
Pb Pr, 364,
Mat, II, 25

Habitat.—A pinkish-white-flowered shrub, common in waste places throughout the greater part of India and Burma and in the damp forests of Ceylon up to an elevation of 5000 feet. Grows gregariously, forming a dense under-vegetation, specially associated with the Bamboo. On passing into fruit the calyx becomes scarlet, and the plant is then even more attractive than when covered with its sordidly-scented flowers.

Medicine.—Dr Bholanath Bose calls attention to the LEAVES of this plant as a cheap and efficient substitute for chiretta as a tonic and antiperiodic" (*Pharm Ind*). According to Dr Kanny Lal De, O I E, the fresh juice of the leaves is employed by the natives as a vermifuge, and also as a bitter tonic and febrifuge in malarious fevers, especially in those of children. Dr Dymock states that he has not seen the leaves used medicinally in Bombay, but they are bitter. Dr Honigberger mentions the use of the BARK in medicine by the Arabian and the Indian physicians.

MEDICINE.
Leaves,
1381Jules
1382
Bark
1383

Special Opinions.—§ "The expressed juice is an excellent laxative, cholagogue and anthelmintic. It is used as an injection into the rectum in cases of ascarides. It is also a valuable bitter tonic, and the natives believe that its presence cures scabies in the locality" (*Brigade Surgeon J H Thornton B A, M B, Monghir*). "Is said to be a very useful antiperiodic" (*Surgeon Major E Sanders Chittagong*). "The juice of

"Decoction of the leaves is used as an antiperiodic" (*Surgeon Anund*
"used as a
"Officer II
"(*Surgeon-*

Decoction.
1384

Domestic Uses.—Edgeworth mentions that this plant is used in the Ambala district to give fire by friction

DOMESTIC.
1385

C. 1385

CLERODENDRON
serratum

Medicine for Cattle

1386

Clerodendron phlomoides, Linn Fl Br Ind IV 590 ^[Ic t 1473] ^{Wight}
 Vern.—*Man A H n D C C C C*

References—*Roxb Fl Ind Ed C B C 477 Brand s For Fl 363*
Gamble Ma Tmb 298 Thwa tes E Ceylon Pl 243 Dals &
G bs Bomb Fl 200, At h son Cat Pb Pl 120 Vo gt Ho t Sub
Cal 465 Dymock Mat Med W Ind 498 Ansl e Mat I d II
498 M rray Pl and Drugs Snd 174 S Arj n Bomb Drugs 94
Royle Ill Hin Bota y 299 Balfour Cyclop

Hab tat—A tall pubescent shrub common in many parts of Ind a
 pr nc pally n the drer regions of the Panjáb Sind Mar vara the Dekkan
 Behar Bengal Oudh Central Prov nces and also in Ceylon

MEDICINE
Root
1387

Medicine—Dr Dymock says that the nat ves of Western Ind a sup
 pose the ROOT of the plant has iterat ve propert es but he has never
 seen it used as such
 valescence o mersles
 to Ansl e cons dered t

plant to the r cattle
 to cu e them ol d arrhoea and worms or when the stomach s ells Mr
 Campbell also says the Santals rub the plant over the r bod es in dropsy

1388

C serratum, Spreng Fl Br Ind IV 592 ^{Wight Ic t 1472}
 Vc " "

SANTAL
 bharang
 addakk
 ra gi or
 ndpu(u
 a (root)

References—*Brand s For Fl 364 Kurs For Fl Burm II 267*
Gamble Man Tmb 299 Dals & G bs Bomb Fl 200 At h son
Cat Pb Pl 12 Vo gt Ho t Sub Cat 465 Pharm Ind 164
Med W I d
le Cat Raw
ury U Pl
168 Balfour

Cyclop

Hab tat—A blue flowered shrub common in the Sub H malayan tract
 " " " " " " " " " "

MEDICINE
Root
1389

Leaves
1390

Seeds
1391

ck
 re
 ely
 "

C. 1391

A Charm against Disease

CLITORIA
Ternatea.

Special Opinions — § 'Slightly aperient' (Surgeon H W Hill, Man-
bhoon) 'Used in infusion (3i to xx) in bronchial affections, and as a
inally

The
y the

FOOD
Leaves
I392
Root.
I393
I394

[Wight, Ill, t 173
Clerodendron Siphonanthus, R Br, Fl Br Ind, IV, 595.

Syn — SIPHONANTHUS INDICA, Linn, Roxb, Fl Ind, Ed C B C, 481

Va - P U - B - L H - K - L - M - N - O - P - Q - R - S - T - U - V - W - X - Y - Z

Medic
Bengalis
"The ro
tions T
asthma :

for diseases of the lungs A CONFECTIO called *Bhārgiguda* is prepared
with a decoction of this root and the ten drugs called *dasamula*, chebulic
myrobolan, treacle, and the usual aromatic substances It is used in
asthma An OIL, prepared with a decoction and paste of the root in the
usual proportions, is recommended for external application in the maras-
mus of children" (U C Dutt, Mat Med Hind, 219) Mr. Baden
Powell writes that the PLANT is slightly bitter and astringent, and that
the resin is employed in syphilitic rheumatism

Special Opinion — § 'The expressed juice of the leaves and tender

GUM
I395
MEDICINE
Wood
I396
Root.
I397
Confection.
I398

Oil.
I399
Plant.
I400

Juice
I401
Beads
I402

Monghyr)

CLITORIA, Linn, Gen Pl, I, 528

[LEGUMINOSÆ

Clitoria Ternatea, Linn, Fl Br Ind, II, 208, Bot Mag, t 1542,

Va - P U - B - L H - K - L - M - N - O - P - Q - R - S - T - U - V - W - X - Y - Z

I403

C. I403

CLITORIA
Ternatea.

A Powerful Cathartic.

*Indumilappa, kungund, gokarna mul, KAN; vishnu kranti, as-
phota, aparajita, gokarna mul, nilaghir, kurni, nila-ghuria, khurne,
SANS; Mazarayunt-hindi (Indian Mezereon), basruimasar, yune-hindi
(seeds), ARAB, Darakhte-bikhe-hayat, tukhme bikhehayat (seeds), PERS,
Bukhu, pai noung mi, sung mai phyá, BURM, Kattarodu, nil katta-
rodu, nil-katarolu, SING*

References.—Panch. D. Ind. E. J. C. B. C., 1864, 11—12, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

Habitat.—A common garden flower, also occurs in every hedge-row all over India. The seeds were first taken to England from the Island of Ternate, one of the Moluccas, hence the specific (and former generic) name of the plant.

Dye.—Bidle remarks that the SEEDS are said to be used by dyers. "The corollas of the blue variety are said to afford a blue dye in Cochin China, but it is not permanent; and Rumphius says that they are used for colouring boiled rice in Amboyna" (*Treasury of Botany*).

Medicine.—The ROOT is a powerful cathartic like jalap, and has been recommended to be used along with other laxatives and diuretics in ascites and enlargements of the abdominal viscera (*Dymock*). Ainslie recommends it in croup as an emetic, but O'Shaughnessy, in *Bengal Dispensa-*

DYE.
Seeds
I404

MEDICINE
Root.
I405

Seeds.
I406

Leaves
I407

as a diuretic, and in some cases as a laxative. The SEEDS are, however, more useful, and have gained a certain reputation in Europe as a safe medicine, especially for children. The powdered seeds are purgative and aperient. Combined with acid tartrate of potash and ginger, they are administered in the same doses as jalap. The infusion of the LEAVES is used for the same purposes as the seeds.

ing and to act as an antidote to poisons. The roots are used as emetics and in rheuma — — — — — anthel-
mintic, and in
orders, also in
"The juice of
in cases of colliquative sweating in hectic fever" (*Taylor, Med. Jur.*
Dacca, 52, 53).

Special Opinions.—§ "There are two varieties of *Clitoria Ternatea* distinguished by the colour of their flowers, as blue and white, and the blue

C. I408

Juice
I408

Clitoria Seeds—a Medicine used in Croup, &c

CLOVES.

again has a sub variety, in which the flowers are double. There is no distinct difference between the action of the seeds of these varieties, or if any at all, it is in favour of the white one. The plants are in flower

MEDICINE.

this precaution are nearly round or slightly compressed along the edges oblong, dull green, greenish brown, or brown in colour, and minutely mottled. The ends of some seeds are round, and of others flat, as though cut off clean by a knife, taste d sagreeable and acrid, and no smell. The thicker and rounder the seeds are, the more active they prove. The immature seeds are flat and dark brown in colour, the matured thick and round seeds are an efficient purgative and produce five or six motions in one drachm or one drachm and a half doses. Their action is increased in proportion to the increase of their quantity up to two drachms, when the

seeds are one of those
but they may also be
in equal proportion,
the compound powder

The dose of the compound powder is from a drachm and a half to two drachms. The following are the uses of Clitoria Seeds.

dome

childr

It act

thus :

doses

the sy

scaldi

gonorrhoeal discharge itself is much abated under its use. One small root is generally a dose for children under two years, and one large root or two small ones for those between three and six years. For adults

1409

The roots of the blue species are used as an antidote in cases of snake-bite" (Brigade Surgeon J. H. Thornton, B.A., M.B., Monghyr). "The seeds are used as a mild purgative for children" (Surgeon Major J.

white flowers and the
st" (Not a Doctor
a drastic purgative
geon Shib Chunder
owdered root of this
dropsy" (Surgeon

1410

Major John North, Bangalore)

Sacred Uses.—The flower is held sacred to the goddess Durga

Clover, see *Trifolium pratense*, Linn., LEGUMINOSÆ

Cloves, see *Caryophyllus aromaticus*, Linn., MYRTACEÆ

SACRED
USES,
1411

C. 1411

COAL.	Coal
1412	<p>CNICUS, Linn , <i>Gen Pl</i>, II, 468</p> <p>Cnicus arvensis, Hoffm , <i>Fl Br Ind</i>, III., 362, COMPOSITEÆ</p> <p>Syn — <i>CARDUUS LANATUS</i> Roxb , <i>Fl Ind</i>, Ed C B C, 595</p> <p>Vern — <i>Bhur bhur</i>, N W P</p> <p>Reference — <i>Smith, Dictionary</i>, 410</p>
OIL Seeds 1413	<p>Habita — <i>W</i> <i>S</i> <i>L</i> <i>N</i> <i>P</i></p> <p>Gangetic</p> <p>Oil —</p> <p>The seeds them for their own use It burns with smoke, is otherwise of good quality</p> <p>Cnidium diffusum, see <i>Seseli indicum</i>, <i>W & A</i>, UMBELLIFERÆ</p>
1414	<p>COAL.</p> <p>Coal</p> <p>CHARBON DE TERRE, <i>Fr</i>, STEINKOHLEN, <i>Germ</i>, CARBONI FOS SILI, <i>It</i>, CARVES DE PEDRA, <i>Port</i>, CARBONES DE PIEDRA, <i>Sp</i></p> <p>Vern — <i>Kôyelah</i> or <i>kuela</i> HIND, <i>Kôyala</i>, BENG <i>Kôlsa</i> DUK <i>Kari</i> or <i>Simai karri</i>, TAM, <i>Boggu</i> or <i>Sima boggu</i> TEL; <i>Kari</i>, MAL; <i>Iddattu KAN</i>, <i>Koelo, kolso</i> GUJ, <i>Aiguru</i> CING <i>Fahm</i>, ARAB; <i>Zughal</i>, PERS, <i>Angaraha</i> SANS, <i>Mizu</i>, <i>midu ye</i> BURM</p> <p>References — So much has been written regarding Indian Coal that an enumeration of the publications would occupy many pages The reader is referred to <i>Ball's Economic Geology</i>, pp 599 604, to the <i>Memoirs</i> <i>Records of the Geological Survey</i>, and to the <i>Journals of the Asiatic</i> <i>Society of Bengal</i> The following works may, however, be specially men- tioned —</p> <p><i>Final Report of the Coal Committee</i> Dr T. Oldham's <i>Report on the</i> <i>Coal Resources of India</i> <i>Sel Rec Govt Ind</i> LXIV</p> <p><i>Ball's Coal fields and Coal productions of India</i> <i>Annual Adminis-</i> <i>tration Reports on Railways in India</i></p>
1415	<p>REGIONS OF INDIAN COAL</p> <p>The following account of the coal fields of India has been furnished by Mr H B Medlicott for this publication —</p> <p>ABSTRACT OF THE FEATURES OF INDIAN COAL</p> <p>"India possesses extensive stores of coal, though none of it belongs to the so-styled carboniferous period, and in India itself the coal measure rocks are not all of one formation All the coal of peninsular India occurs in the rocks known as the Gondwana system, the fossil flora of which has a Mesozoic facies, and all the coal of extra peninsular India occurs in rocks of Cretaceous or tertiary age In both cases the distribution is partial and north in the north North-W Madras f margin of the Indo-Gangetic plains from Sind to Pegu but it is only in Assam and Upper Burma that valuable measures have been found where a Cretaceous coal occurs in workable quantity</p>

Coal fields of India

(H B Medlicott)

COAL.

'In both regions the quality of the coal varies much as in all coal-ndard, almost if not Gondwanan (Bengal) some an excess of ntrige of ash is low, producing a lighter

fuel The following tabular statement exhibits these facts —

	BENGAL		ASSAM	
	Average of 31	Best	Average of 23	Best
Fixed carbon	53 20	66 52	56 5	66 1
Volatile exclusive of moisture	25 93	28 12	34 6	33 5
Moisture	4 80	9 6	5 0	
Ash	16 17	4 40	3 9	4
	100	100	100	100

In Bengal only the Raniganj and Karharbari fields have as yet been largely worked and to a small extent the Daltonganj field. Several other large coal-fields are still quite untouched, owing to difficulty of communication.

"In the Central Provinces the Mohpani mines in the Nerbada valley, and the Warora mines in the Wardha valley, have been for some time in work and the* Umaria and Sohagpur fields in the Rewah State are being opened up.

"In the* Singareni and Sastri fields of the Nizam's Territories some preliminary mining has been carried out pending the establishment of railway communication.

"Vigorous mining enterprise has recently been started in the Makum coal field in Upper Assam."

MORE DETAILED STATEMENT OF THE COAL-YIELDING DISTRICTS

'The mineral is more particularly developed in the central eastern portion

SOUTH INDIA
1416

the field about 38 miles
tent, and contains four
is the most southern

36', Long 81°7' Has its
the River Godavari, on
ons of coal, of which only

seams, neither of which ex-
e Godavari, and another,

"Singareni —The best field as yet known for Madras, but still in the Nizam's Dominions, is that near Singareni, lat 17°30'30", long 80°20'. There are five seams the thickness of one was not ascertained, those of the

* Since opened out

Coal-fields of India.

Amaram—Lat. 18° 5', Long 80° 14'. Two seams of fair coal, 9 and 6 feet in thickness respectively. The available coal is estimated at 1,132,560 tons, its position is, however, unfavourable to its development.

"Antergaon—Lat. $19^{\circ}32'30''$, Long $79^{\circ}33'$. South of this place a 6-foot seam occurs, 9 inches of which are shale

"**Sasti and Paoni** — In the Nizam's Dominions, included in the Wardha area, a 50-foot seam occurs here, a considerable portion of which is of good quality. 30,000,000 tons of coal are estimated to be available from this source.

valley of the Brat-
coal is of an interior

On the western margin of the Rajmahal hills, coal measure rocks are exposed, and these doubtless extend over a vastly greater area under the younger formations. Separated by these overlying rocks, there are five distinct fields, namely, Hura, Chaparbhita, Pachwara, Mohowgurhi, and Brahmini. There is no continuity of the seams in each of these, while the data about them are very vague and incomplete. If the coal measures extend below the trap to the east, they would be close to the water carriage of the Ganges and hence transport would be cheap, but on the other hand the coal of this region is for the most part stony and bad.

"Deogarh.—In the Jainti, Sahajori, and Kandit Karaiah fields, coal of different qualities occurs. Some in the Jainti field is excellent, but that known from the Sahajori area is inferior.

"*Karharbiri* or *Kurharbati*, in the district of Hazaribagh—This small field, having an area of 8 square miles, is of great importance on account of its position (about 200 miles from Calcutta by rail) and the good quality of its coal. The coal occurs in three principal seams, with an average total thickness of 16 feet, the estimated amount of coal is about 136,000,000 tons, while the available portion is estimated at

14,000,000,000 tons. The total area exposed is about 500 square miles, but the real area is possibly even double that, as the beds dip to the east under the alluvium. This is the largest and most important coal field in which coal is worked in India, its proximity to the main line of railway, and to the port of Calcutta, tending to give it pre-eminence over other less favourably situated localities. The principal Companies engaged here in the extraction of coal are—the Bengal, Barakar, Equitable, New Birbhoom, and Raniganj Association, besides many minor firms and native associations. Many of the seams are of considerable thick-

ORISSA
1417

BENGAL.
1418

Coal fields of India

(H B Medlicott)

COAL.

ness, one containing from 70 to 80 feet of coal. As a rule, however, the best coal is not found in the very thick seams.

"Jharia or Jariah"—This field is situated in the valley of the Damuda river, 16 miles west of the Raniganj field, and is nearly all included in the district of Manbhum. The thickness and quality of the seams vary a

Nothing has been done to develop the resources of this field.

"Ramgarh"—This field, situated to the south of the Bokaro field, has an area of about 40 square miles. The coal is for the most part of poor quality and limited in extent.

There are probably 5 million tons in the field, and it is believed that some of the natives carried to Ranchi for sale.

"North Karanpura"—Situated at the head of the Damuda valley, has an area of about 472 square miles, and the estimated amount of coal is 8,750 million tons.

"South Karanpura"—Situated to the south-east of the northern field, has an area of 72 square miles, and the estimated amount of coal is 75 million tons. The assays of some of the coal indicate a high calorific power.

"Choke"—Is a small field of less than a square mile in extent. Situated on the Hazaribagh plateau.

"Itkuri", 25 miles north west of Hazaribagh. A few seams of inferior coal are exposed.

"Aurunga"—In the district of Jharkhand, in the valley of the Koel, a tributary of the Son. The area is 97 square miles, and the estimated amount of coal is 20 million tons, but the quality of the coal as taken from the outcrop is poor.

tons
"Tatapani, Jaria, and Morne"—Situated in the valley of the Son and tributaries. These fields are portions of a large tract stretching far to the westward. Several coal seams of workable thickness and many thin ones exist.
 NORTH-WEST PROVINCES.
 1419

COAL.

Coal-fields of India.

"*Korav*—Three miles north of Umari. The area is 9 square miles, and a thick seam of good coal has been proved.

"*Thilmili*—Is another area of about 41 square miles, in which seams of some promise have been observed.

"*Bisrampur*—Has an area of about 400 square miles occupying the central basin of Sarguja; it contains some good coal suitable for locomotives.

CENTRAL
INDIA.
1420

With the other associated rocks, these occupy an area of at least 1,000 square miles, some of the seams are very thick, two being respectively 90 and 168 feet, but though including good coal they often contain a large proportion of shale, and the horizontal extension of the seams is sometimes irregular and uncertain. These fields will probably assume importance in connection with the line to connect Calcutta with the Central Provinces. The recent boring experiments show that the Korba area has proved most worthy of consideration, particularly at Ghordewa, 9 miles to west north-west of Korba, where there is a 5-foot seam of good coal.

CENTRAL
PROVINCES.
1421

"*Satpura Basti*—The field is of importance in Indian Peninsula. The coal is worked by the Nagpur Coal Company and supplied to the railway, but the supply falls short of its requirements.

"*Shahpur* (or *Betul*) on the south of the Tawa valley—This field

of which are of

near the village of District, contains 38 feet. other areas, Sassi 1 to exist. There

HYDERABAD.
1422

Warora basin	14	} million tons
Chugus	45	
Wun	1,500	
Between Wun and Papur	50	
Between Janara and Chicholi	75	
Sassi and Paoni (Nizam's territory)	30	

The only pits worked in this wide area are at Warora, whence a special branch line conveys the coal to the Nagpur branch of the Great Indian Peninsula Railway.

"*Cutch*—There are a few thin shaly seams at Trambal (Tromba or Trombow), about 5 miles north east of Buj, in a stream north of Sis-agad, and in a stream west of Guneri near Lakhpat. Besides these jurassic seams, there are some tertiary carbonaceous layers of no promise.

BOMBAY.
1423

Coal-fields of India.	(H B Medlicott)	COAL.
		...
		...
		...

purposes. The latest reports give a 6 foot seam of coal near Kosht, but the dip is said to be as high as 45° which will militate greatly against its profitable extraction.

"Chamarling, in the Lum Pathan country, about 75 miles from Dera Ghazi Khan—There are several seams of tertiary coal, of which the principal one has a thickness of 9 inches.

"Kanigaram, in the " al
exists near this place, e ur
in the Ghilgai country a at

containing coal

PANJAB
1426

in places. As the locality is near a good road a fair amount of fuel might be obtained, for Bhaganwalla, the coal is 2 miles, the coal is By means of suitable means, and though in this respect. The available coal is estimated at 16,20,000 maunds (60,000 tons).

"North-West Himalayas—At Dandi, near Kotli, on the Punch, and at the north-west shoulder of the Singar Marg Mountain, there are

HIMALAYAN.
1427

COAL.

Coal-fields of India

28 million tons of coal, of great importance

its command-
on the East
supply of the

square miles,

and a thick seam of good coal has been proved

"*Thulmi*—Is another area of about 41 square miles, in which seams of some promise have been observed

"*Bisrampur*—Has an area of about 400 square miles occupying the central basin of Sarguja, it contains some good coal suitable for locomotives

"*Lakhanpur*—South of the Bisrampur area, holds some seams of good coal, the area is 50 square miles

"*Raigarh, Hingur, Udaipur and Korba* fields in the Mahanadi valley—With the other associated rocks, these occupy an area of at least 1,000 square miles, some of the seams are very thick, two being respectively 90 and 163 feet, but though including good coal they often contain a large proportion of shale and the horizontal extension of the seams is sometimes irregular and uncertain. These fields will probably assume importance in connection with the line to connect Calcutta with the Central Provinces. The recent boring experiments show that the Korba area has proved most worthy of consideration, particularly at Ghordewa, 9 miles to west north west of Korba, where there is a 5 foot seam of good coal

"*Satpura Basin south of the Nerbada Valley*—The *Mohpani* field is of importance in consequence of its position with reference to the Great Indian Peninsula Railway (95 miles by rail, west south west from Jabalpur). The coal is worked by the Nerbada Coal Company and supplied to the railway, but the supply falls short of its requirements

"*Shahpur (or Betul)* on the south of the Tawa valley—This field contains seams of coal, of which are of

Chimur, 30 miles north east of Warora in the Chanda District, contains three seams of coal, with a maximum total thickness of 38 feet

"*Wardha (or Chanda), &c*—Includes, with several other areas, Sisti and Paoni in Hyderabad in which coal has been proved to exist. There are about 1 714 million tons of coal available, viz—

Warora basin	14
Ghugus	45
Wun	500
Bet veen Wun and Papir	50
Bet veen Janara and Ch choli	75
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CENTRAL
INDIA
1420

CENTRAL
PROVINCES
1421

HYDERABAD
1422

BOMBAY
1423

Coal-fields of India.	(H B Medlicott)	COAL
		cryst
		...
		..

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containing coal

"At
alum sha
bed of ju
"Salt

Sunglewar, Chamli Kutta, Dowa Khan, Derwat, Nurpur (Nuhawall), and Karuli, but only in small quantities, presenting no prospect of being profitably worked. At Dandot, in the neighbourhood of which coal is seen at three localities, and where thickest is 2 feet 6 inches. The later develop-

PANJAB.
1426

can be delivered. At Pid there is a seam of good bright fuel 3 feet thick in places. As the locality is near a good road a fair amount of fuel

(60,000 tons)

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HIMALAYAN.
1427

COAL.

Coal-fields of India.

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CENTRAL
INDIA.
1420

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CENTRAL
PROVINCES
1421

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BOMBAY.
1423

C. 1423

Coal and Coal-mining in India.	(W. Saise)	COAL.
abandoned This seam was 11 feet 8½ inches thick, of which 6 feet 8 inches were true coal At Hienlap (or Hienlat), about 6 miles from the last locality, there is a seam from 17 to 18 feet in thickness, and the coal is of pretty uniform character with conchoidal fracture. Three		
	western banks therly is 10 the seam is	
five- far val Part III)		ANDAMAN. 1430
INDIAN MINES.		1431
Dr. Walter Saise, Manager, P. & B. Company, Ltd., Calcutta.		
Indian coal up to present date—		
INDIAN Consumption of Coal— either imp of coal a first, the under—		1432
Imported (1883-84) Raised in India (1884) about		Tons, 678,000 1,556,400 <hr/> 2,216,000
"The value of the former is stated to be Rs. 1,09,96,047. The value of the latter at the pit's mouth may be taken at Rs. 8,45,000. The imported coal is chiefly large or steam coal. The coal at the pit's mouth is taken at 1,200,000 allowed to go to water steam and rubble		

* See page 388.

COAL.	Coal-fields of India.
<p>ASSAM, 1428</p>	<p>to Dalingkote, the coal is of Gondwana age and is much crushed, some of it is in the form of a powder, and has assumed the character of graphite</p> <p>tant) 1 lb. = 16 oz. 470,000 exist a and St</p> <p>of access</p> <p>"Upper Assam—There is an important field at Makum which is being worked by the Assam Trading Company, it contains several seams of coal, one of which is over 100 feet thick, 75 feet being good coal. The beds are disturbed and the coal seams lie at an average angle of about 40°, so that some difficulty may be met with in working them. An approximate estimate gives 18,000,000 tons as available, supposing the workings to be nowhere carried more than 200 yards from the face or 400 feet to the deep.</p> <p>"For the most part workable seams is estimated to have 10,000,000 tons of coal available, this is exclusive of what may be proved by borings, but is mostly of poor quality</p> <p>"Nazira, in Upper Assam—Some of the seams in this field are of considerable thickness, 30 feet and over, the estimated quantity available is 10,000,000 tons</p> <p>"Fanjit and Disat—Two small and unimportant fields in Upper Assam</p>
<p>BURMA, 1429</p>	<p>"Bhamo—In the Arakan Range at the Bhamo Islands on the west coast of the Bay of Bengal, coal has been discovered in the Thabeik Myin district, but after a few cwts had been extracted, the work was abandoned recently and in the fallacious hopes of a source of fuel, have been met with in the division of the Henzada district several seams of coal occur</p> <p>"Tenasserim—C of localities those a Thoo-hte khyoung (where a mine was</p>

Coal and Coal mining in India	(11' Size)	COAL.
abandoned This seam was 11 feet 8½ inches thick, of which 6 feet 8 inches were true coal At Hienlap (or Hienlat) about 6 miles from the last locality, there is a seam from 17 to 18 feet in thickness, and the coal is of pretty uniform character with conchoidal fracture Three		

taceous coal it is well situated for transit purposes On the Paulwing river there are numerous irregular thick seams of tertiary coal

In the Andaman and Nicobar Islands coal is known to exist, but so far as they have been examined there are no grounds for belief that a valuable deposit of coal occurs (See *Manual of the Geology of India, Part III*)

ANDAMAN

1430

INDIAN MINES

1431

Dr Walter Saise Manager, E. I. R. Company's Collieries, has obligingly furnished the following note on Coal and Coal mining in India which, it may here be remarked, is based on the results of 1883-84 but on returns some of which are not accessible to Government This explanation accounts for the apparent discrepancies between the returns of production and consumption published by Government for that year and the figures here given by Dr Saise On a further page will be found more recent figures abstracted from Government returns which bring this brief note on India up to present date —

1432

INDIAN CONSUMPTION OF COAL — The coal and coke used in India are either imported or raised and made in the country The foreign sources of coal and coke supply are Europe, Australia and Africa Taking coal first, the proportion of coal raised in the country and that imported is as under—

Imported (1883-84)	Tons, 678 000
Raised in India (1884) about	1 556 400
	<u>2,216 000</u>

* The value of the former is stated to be Rs 10,96,047 The value of

COAL

Coal and Coal-mining in India

to a smaller extent. The small kinds of rubble or smithy are used in

I433

Below is a table of ultimate analyses of specimens from Karharbari and Raniganj coal-fields with analysis of English and Welsh coals for comparison —

COAL FIELD	Carbon	Hydrogen	Oxygen and Nitrogen	Sulphur	Ash	
Karharbari	78.20	4.34	7.89	0.42	9.15	Main Seam
E I Railway	70.93	4.10	12.49	0.52	11.96	Upper Seam
Raniganj (N. B. Coal Co.)	74.31	5.12	9.67	0.47	10.43	
England { Newcastle	82.83	5.32	7.13	1.17	3.55	
{ South Wales	88.47	4.59	3.02	1.25	3.09	

"It will be noticed that in several particulars Indian coal is inferior to English, *1st*, in containing more ash, and *2nd*, less carbon and hydrogen

"In the table below the commercial analyses of many Indian coals by the writer and Mr T H Ward, FGS, are given, as also commercial analyses of Newcastle and Welsh coals, for comparison —

COAL-FIELD	Spec gravity	Ash	Fixed carbon	Volatile matter	Sulphur	Heating power by Thomson's calorimeter	REMARKS.
BENGAL { Karhar						13.20	
{ Raniganj						12.50	
{ Tindana						12.89	
{ Raniganj						13.89	
{ Tindana						12.35	
CENTRAL { Raniganj						12.40	Not worked
{ Tindana							
{ Raniganj							
{ Tindana							
WELSH { Newcastle	1.312	3.68	82.66	13.66	1.59		
{ Raniganj	...	3.49	63.25	33.26	1.07		

"The above table shows that there is great diversity in the chemistry of the coals of India, and the variations in physical features are just as marked. With the exception of Tindana and Assam coal, all Indian coals are remarkably laminated in structure, the laminae consisting of a dark highly

Coal and Coal mining in India

(W. Saise)

COAL

carbonaceous shale, a bright pitch looking matter, and a mineral charcoal — a very dull charcoal looking substance. When these laminae are very

volatile matter

COMPARISON OF INDIAN WITH IMPORTED COAL FOR RAILWAY PURPOSES — The Indian and imported coals have been tried on Indian Railways with the following results —

1434

EAST INDIAN RAILWAY

COAL	Gross weight of trains	lb per ton of coal consumed	lb per ton mile
	Tons cwt		
Ka harbari	207 19	30 12	145
Ran ganj Sanctor a	212 17	32 21	151
Equ table	208 1	33 68	161
O d nary	204 14	36 98	181
North Wales	215 9	31 90	148
South Wales Ca d ff	203 11	32 64	160
New South Wales	207 14	31 42	151

D W CAMPBELL

Locomotive Supdt, East Indian Railway

COAL	Gross weight of trains	lb per ton of coal consumed	lb per ton mile
	Tons cwt		
Ka ha bar	166 12	25 76	155
Ran ganj	181 7	33 31	184
Barakar	170 3	30 04	177
Lothargills (S W)	183 12	30 45	165
North Wales	174 9	27 12	156
Austral a	} 180 4	27 43	133
Duckenfield			
Merthyr			
Godavari			
	171 12	33 48	196

F H TREVETHICK,

Locomotive Supdt, Madras Railway

COAL.

Coal and Coal-mining in India.

"It will be seen from these results that Karharbari coal is a good steam coal, little inferior to imported coals, and that the other Indian coals (except Godavari) are of fair quality. Umaria coal, tried on the Great Indian Peninsula, gave 42 63lb per train mile with a gross load of 410 tons. This is nearly but not quite as good as Karharbari coal.

INDIAN PRODUCTION—"The sources of Indian coal supply and the estimated yearly output are as under:—

CENTRAL PROVINCES	{ Warora	.	.	.	.	100,000
	{ Nerbada	.	.	.	.	28,000
	{ Umaria	.	.	.	.	7,290
BENGAL	{ Karharbari	.	.	.	.	520,000
	{ Raniganj	.	.	.	.	890,000
ASSAM	.	.	.	.	.	50,000
						<u>1,595,200*</u>

As the newer fields develop this estimate will have to be increased

DISTRIBUTION OF INDIAN SUPPLY—"The Warora coal-field is connected with the Nagpur branch of the Great Indian Peninsula by the Wardha Coal State Railway, the Mohpani (Nerbada) coal-field by a branch from Gadawara with the Great Indian Peninsular. The Umaria coal-field has been tapped by the new line from Kutni through the East Indian Railway, Jubbulpur line. The Assam coal field is connected

the fol-
Wardha
ial going

"The Bengal coal finds its way to the Panjáb railways and the railways of Bengal, as also into the manufactories of Calcutta and the large cities along the line of railway. Some is used in the steam ship lines. Small coal is largely employed for brick making. Comparatively little is utilized for domestic purposes. The Colliery Companies should endeavour to create a want by teaching the people how to use small coal in large towns, such as Allahabad instead of wood and cowdung. Agencies like those in English cities could probably do this in a few years, and the large waste of small coal that goes on at present would thus be obviated.

I435

MINING IN INDIA.

"Has made considerable progress during the past few years, machinery and well-appointed heapsteads and pit frames are coming generally into use

which is 402 feet deep

"The system of working varies very much. At Warora, Central Provinces, where 100,000 tons per annum is wound by direct acting engines out of two shifts 200 feet deep, the system most nearly approaches the

* It may be noted that it is the marketable coal that appears in the Government returns, not the actual amounts raised. In 1883-84 these were 1,200,957 tons. Conf. with p. 385.—Ed

Coal and Coal-mining in India (11' Size)	COAL.
--	-------

English
day morn
shifts of 8½
thus Gai

in height, leaving the roof coal, and pillars 40 feet square. The coal is so hard, it has to be nicked and undercut and then blasted down. The pillars are worked by splitting each from one headway to another and then taking the far end off in slices. The roof coal comes with it.

"At the Mohpani collieries a similar system is worked. The difficulties met with in these mines, owing to the faulted and disturbed nature of strata, are probably unequalled in India.

Karharbiri coal-field—"Is the smallest field in Bengal. It is mainly worked by three Companies, the East Indian Coal Company, and connected with the main line worked by locomotives.

a scene of great activity. As much as 50,000 tons of coal and coke have been raised and despatched in one month. The coal field is connected with the East Indian Railway Chord line by a branch from Madhupur to Gridi, the terminus or colliery station. In mechanical arrangements for raising coal, this coal field is well advanced. The old fashioned gin is almost obsolete and bullock-carts have little to do.

"The system here is similar to that obtaining all over Bengal. The

and make are now universal, the crowbar and single pick having been ousted. The workings are on the bord and pillar system. Pillars vary from 12 feet to 40 feet square and 40 feet X 60 feet. In the shallow mines and thin seams (7 to 8 feet) the former size obtains, in the thick seams (from 12 to 20 feet thick) the latter. Pillars are worked in the 8 feet seam in the following manner. A 4 feet chock is placed between each pillar in the row of pillars (generally six in number) that are to come out. A chock is also placed in front of each pillar. The pillar is then attacked from the front side. When pillars are taken out the chocks are withdrawn and the roof falls.

"The

the Bauris are not in such requisition as formerly.

"Drainage is effectively carried out by Tangye's special and lifting and forcing pumps, worked by bob levers from horizontal engines. The machinery is of good type, and winding and hauling are done by good engines.

"Ventilation is attended to in the deep mines, mainly by furnaces or steam jets.

Coal and Coal-mining in India.

(W. Saise)

COAL.

considerable -- of the seam 12
feet to 16
the roof, r
insists (anc
mencing o
height of the seam has been excavated. His chief and dearly-prized
weapon is a 'sabal' or crowbar with a sharp point at one end. With this
he smashes the coal, standing always when at work. He never grooves
beyond the first 'cleat,' gangs of 4 or 5 men occupy each gallery; they are
paid b
tom
caste (

played

tram or bucket' The women often take their babes, 2 and 3 months old,
down the mine, taking with them also a small cot on which the child sleeps
or plays while its parents are at work

coal get 'won' being from much less depths Some fire damp has been
met with in the western part of the district Chanch colliery (west of
the Barakar) belonging to the Bengal Coal Company was abandoned
some years ago after the fire had burnt, some
al Coal Com-

idly been men-

the outcrops

merely, of these magnificent seams, and thousands of tons remain still
to be worked without in

"The 'Bauri' is t
the district In some
amusing like those of
drunk, especially at wee
on Mondays For the
a difficult matter to per
(contract) rate for his
do more than will, with his wife's contribution, keep the household 'in
rice' and himself in drink for the day. The nearly universal and very
bad custom in this district is to pay each evening for the work done
during the day The collier or cooly has often to wait about until 8 or
9 P.M. for his money. Up to the end of the day and evening

house is often substituted). In this he places a small quantity of oil and l

COAL.

Trade in Coal.

a portion of wick. Any oil he can save from his 'allowance' is his

The ignorant native has not yet recognised that his health and longevity is in question, and he has besides helped much to prevent ventilation becoming a necessity by the wonderful power of endurance he has shown. This power of endurance enables him to work for hours at the bottom of a sinking shaft with water pouring over his naked body or to work all

I438

India employs about 30,000 persons, the quantity of coal raised per annum per person employed, surface and underground, being 51 tons.

"In Europe the numbers are different, varying with the thickness of seams and nature of difficulties met with :

England (average)	348 tons per person employed under-ground and surface per annum.
Belgium	134 Ditto
Saarbrücken	187 Ditto

There is no Government regulation of the coal industry ; any person can manage a mine on any system he likes, whether or not he has experience or training. Interest has a great deal with the appointment of the managing staff, and it is to be feared that the best is not made of the splendid coal deposits, the favourable roof, and the moderate depths and inclinations of the seams "

I439

TRADE IN COAL.

The following brief note, prepared by the Revenue and Agricultural

YEAR	COAL.		Coke	Patent Fuel	Wood
	English	Country			
	Tons	Tons	Tons	Tons	Tons.
1887	212,529	473,210	9,564	30,029	292,808
1886	240,063	463,948	9,132	26,212	259,513
1885	225,721	476,277	10,439	23,117	255,178

C. I439

Trade in Coal.

COAL.

	however, 37 were in Umeria in Rewa district worked. The
	Tons
Bengal	1,187,000
Central Provinces	117,300
Assam	70,800
Central India	13,500
TOTAL	1,388,600

Assam has since increased its output, the figures for 1886-87 being returned at 72,000 tons. It is stated in the Railway Administration Report for 1886-87 that—

"Coal continues to enjoy the confidence of the public. Its sale to the river steamers and tea factories for by the Dacca State Railway, the Eastern Bengal State Railway. It is being largely enquired for by Calcutta, also by the Eastern Railway. It has been found suitable to the engines and the Northern Bengal State Railway, but the difficulty of access to these two railways from the river Brahmaputra prevents its extensive use by their administrations. The coal continues dusty, though it is being mined deep in the hill sides. But its nature is beginning to be understood, and its friability is not found to be a drawback to its use as a steam fuel."

"The coke is found to be saleable to the tea factories of Lakhimpur to an extent of about 3,000 tons per annum. The Company is preparing by means of an increased labour force to enlarge the output of coal to 100,000 tons yearly."

Collieries have recently been opened out at Dandot (Panjab) and Singareni (Nizam's Territory). The coal in these mines has been pronounced of good quality, and in Upper Burma coal has been found (in the Kali Valley on the Chindwin River), but arrangements have not as yet been made for its sale.

The commencement of this industry appears to date back to 1820, when a mine was opened in the Raniganj district in Bengal. For twenty years no new mine seems to have been opened, and then only three mines were opened down to 1854. In that year the commencement of the Eastern Indian Railway line which was laid to run through the coal-bearing regions of the Damodar basin was completed.

In the paragraph above the number of mines in 1886-87 is stated to be 100.

COAL

Trade in Coal

doubled themselves since 1866-67, having risen from 341 000 tons, valued at Rs55 lakhs, in that year to 765 000 tons valued at Rs130 lakhs in 1886-87. The United Kingdom supplies nearly all the imported coal, though Australia, which ranks next to it as a source of supply, is now sharing more largely in the imports, the value of its consignments in 1886-87 being Rs 20 lakhs. The percentage of the imported coal taken on its journey from the ports to the interior is about 10 per cent.

Bombay which is too remote from the Indian coal fields to take advantage of them. The percentage taken by each province in these imports is noted on the margin.

INTERNAL TRADE — Statistics may now be given regarding the internal movements of coal by rail during 1886-87 between the different blocks (i.e., provinces, chief towns and Native States). The total trade amounted in quantity to 1 097 300 tons and in value to Rs158 83 lakhs. The position of each block as a net exporting or importing centre may be thus indicated —

Exports,	Tons	Imports	Tons
Bengal	743 000	Calcutta	304 000
Bombay Town	162 000	Bombay Pres. dency.	167 000
Central Provinces	44 000	North Western Pro-	
Karachi	7 000	vinces and Oudh	161 000
Assam	4 000	Rajputana and Cen-	
Madras Town	2 000	tral India	66 000
Madras	1 000	Punjab	35 000
		Berar	23 000
		Sad	5 000
		Mysore	4 000
		Nizam's Territory	3 000

As might be expected, Bengal, where the most extensive mines in India are situated takes the lead among the exporting centres. Of its

Mysore from Madras and the Nizam's Territory from Bombay Town.

The development of the coal industry in India is indicated by the fact that the gross exports from Bengal to other provinces and Calcutta have increased from 641 807 tons in 1882-83 to 755 831 tons in 1886-87 and those from the Central Provinces from 26 451 tons to 56,125 tons during the same period. Assam for the first time shows a net export (4,000 tons) in referring to which the Director of Land Records and Agriculture writes — 'This is entirely due to the increased output of the Alakum coal mines near Dibrugarh, which now supply nearly all the coal used in the Assam Valley besides furnishing large quantities for export.'

Coke (A note contributed by Dr W Saxe)

Coke is imported and also made in India. In 1883-84 the imports amounted to 16 700 tons valued at Rs4 10 738. Coke, however, is now made to a very large extent in Bengal. It is a most important industry in

Cobalt

COBALT.

its relation to coal raisings as the manufacture of coke means the utilization of small and otherwise useless coal. The industry is of recent and very rapid growth having increased fourfold since 1875. There are two kinds of coke called respectively hard and soft. The former is dense and is

less expenditure of coal. Soft coke is incompletely burnt coal, made for the purpose of charcoal.

except

India show that in a year about 55,000 tons of coke exclusive of foreign coke are led over the line, add to this the home consumption, the respect

I443

Hard coke for foundry blast furnaces locomotive, &c.
Soft coke

65,800

11,200

per annum. The —
a point of great
plant of washing
of the market
collieries

COBALT

I444

Cobalt; *Ball, Econ. Geol.*, 324 & 616, also *Mallet, Mineralogy*, 27

Cobalt metal is never met with in the native form, except in small proportions as a constituent of —

chiefly in primitive rocks and
to a nickel iron and often b

sulphur or by arsenic or by

Species Cobalt or tin white Co

Linnæite or Cobalt Pyrites $\text{CoS} + \text{Co}_2\text{S}_3$

Vern — The —

a

t

t

SOURCE — A complex mineral (*selita*) is found in various mines in Rajputana especially in those of Babur and Bagor near Khett. Mr Mallet says of this substance that it has the specific gravity of 6.00. On analysis it yielded the following composition —

I445

Sulphur
Arsenic
Antimony
Nickel
Cobalt
Iron
Gangue

19.46

43.87

a trace

a trace

25.30

7.83

50

100.26

C I445

COBALT.

Source of Cobalt.

This substance is generally known as Cobaltite. In the *Rajputana Gazetteer*, and in the *Jury Reports* of the Exhibition of 1862, occur accounts of the Jeypore enamels, but in a recent publication, Dr. T. H. Hendley (*Journal of Indian Art*), gives more precise details. Sir George Birdwood (in his *Industrial Arts of India*) under Enamels (pages 163-165) and also under Pottery (pages 301-314), gives most instructive parti-

scribed Cobaltite, in the Records of the Geological Department, seem to be unanimous in their opinion that Cobalt is only rarely met with in India, and that, too, in the mines of Rajputana alone (as far as peninsular India is concerned), and that the oxide is artificially prepared; in other words, that it does not occur naturally in Central and Southern India.

1446

will be found some account of the uses of cobalt in the ceramic industry while Dr Hendley says that the colours used by the Jeypore enamellers "are obtained in opaque vitreous masses from Lahore, where they are prepared by Muhammadan *manishars* or bracelet makers. The Jeypore workmen state that they cannot make the colours themselves. The base of each colour is vitreous and the colouring matter is the oxide of a metal such as cobalt or iron. Large quantities of cobalt are obtained from Bhagore near Khetri, the chief town of a tributary State of Jeypore, and are used in producing the beautiful blue enamel." In these passages Dr Hendley does not make it quite clear whether the Jeypore enamellers prepare their own material for the blue colour, though unable to prepare the other colours, or whether the entire mass of the crude material is conveyed to Lahore and other centres to be prepared and returned in its manufactured

cusses the Multan enamel industry and furnishes particulars regarding the *Mina* blue vitreous enamel. In the *Multan Gazetteer* (p. 107) this subject is enlarged upon, and reference is also made to the Bahawalpur enamels, where, in addition to opaques, a semi-translucent sea green and also a dark blue are produced

Cocculus

COCCULUS
villosus.

In Europe Cobalt is largely used as a pigment and to colour ordinary glass

Coccinia indica, W. & A., see *Cephalandra indica*, Nand., CUCURBITACEÆ

COCCULUS, DC, Gen Pl, I, 36, 961

[PERMACÆ

1447

Cocculus cordifolius, DC, see *Tinospora cordifolia*, Miers., MENIS-

C. indicus (see *Fluck and Hanb., Pharm., p. 31*), a commercial synonym for *Anamirta Cocculus*, W & A., see Vol. I., A. 1037.

C. Leæba, DC, Fl Br Ind, I, 102

1448

Vern — *Ullur, ullar billar, parmatte vehri*, Pn, *Ullar billar*, SIND

References — *Gamble Man Timb*, 11 *Brandis, For Fl of Stewart*, Pb Pl 6 *Aitchison, Cat Pb and Sind Pl*, 3, *Murray, Pl and Drugs*, Sind 38

Habitat — A large climber of the dry and arid zones, especially of Western India — the Panjab, Sind, and the Carnatic

Medicine — Stewart says the stems often become as much as 3 or 4 feet in girth. It is used in Sind and Afghanistan in the treatment of intermittent fevers and as a substitute for *Cocculus indicus* (*Murray, Dymock*)

MEDICINE,
1449

Food and Fodder — In the Trans Indus, Stewart says, it is browsed by goats but by no other animals. Said to be used as a partial substitute for hops in the manufacture of Indian beer (*Murray*)

FOOD and
FODDER
1450
Hop
Substitute.
1451

C. palmatus, DC, see *Jateorhiza palmata*, Miers

C. villosus, DC, Fl Br Ind, I, 101.

1452

Vern — *Gamta ki bel, hier, dier*, HIND, *Kursan, namir*, SIND, *Vasana vela*, MAR, *Wassanvel parael*, BOMB, *Kattuk kodi*, TAM, *Dusari tige chipuru tige, kalle-tige*, TEL. In the Concan the Vaidas give this plant the Sans. name of *Vanatiktika*

The plant — — — — —

by the leaves of *Cocculus villosus*

References — *Gamble, Man Timb*, 11 *Roxb, Fl Ind, Ed C B C*, 732, (under *Menispermum hirsutum*, Willd.), *Drury, U Pl*, 145. *Dymock, Mat Med W Ind*, 2nd Ed, 32

Habitat — A large climber of the dry and arid zones, Sind, Panjab, Deccan, extending into Madras and Bengal

MEDICINE.
Leaves
1453

rheumatic and old venereal pums, half a pint every morning is the dose. It is reckoned heating, laxative, and sudorific. By more recent writers the root is said to be alterative and to be a good substitute for sarsaparilla. Dymock remarks that in the Concan the roots rubbed with Bonduc nuts in water are administered as a cure for belly-ache in child-

Roots,
1454

C. 1454

COCCUS
cacti.

The Cochineal Insect,

FOOD.
I455

this as a Sind drug under its bazar name of *zanir*, and remarks that it is employed in pains of the head

Food.—The leaves are made into curry and eaten by patients under treatment, with the roots or the jelly from the leaves. If suffered to stand for a few minutes, the jelly clears, "the gelatinous or mucilaginous parts separate, contract and float in the centre, leaving the water clear like Madeira wine, and almost tasteless" (*Roxb*). With regard to this property the remark under the vernacular name *Farid-bitti* should be read. In Eastern Bengal the writer repeatedly observed the milkmen carrying milk to market with a few leaves of this plant and the spine-like leaflets of the date-palm placed in the vessel. On enquiry he was told these prevented the milk from getting bad through the heat and the shaking to which it was subjected. It has been observed that the plant is not

FODDER,
I456
DOMESTIC
I457

during the famine of 1877-78 in the Khandesh district, and that it is

e plant.
good,

outcrop, bluish purple ink (*Roxb*)

COCCUS; Packard, *Guide to the Study of Insects*, 526.

A genus of Insects belonging to the Coccidæ of the Order Hemiptera. Several species are, by Entomologists, referred to this genus, but two only are of commercial importance,—the one a native of Southern Asia and the other of the

will be found

spherical scale

I458

Coccus cacti, Linn

THE COCHINEAL INSECT; COCHENILLE, *Fr*; KOCHENILLE
SCHARLACHWURM, *Germ*; COCCINIGLIA, *It*, COCHINILLA, *Sp*

Vern — *Amrdana*, BENG, *Kirmas*, BOMB, *Kiranda*, N.-W. P., *Kirm*, PB

References — *Koyle, Prod Res of Ind*, 57, *Encyclop Britannica*, VI, 97;
Balfour, Cycl of India; *Listard Dyes and Tans of India*, *Wardle*,
Report on the Dyes of India, *Buck, Dyes and Tans of N.-W. P.*

The Cochineal Insect.

COCCUS
cacti.

Official Papers on Pigments used in India, Crookes, Dyeing and Calico Printing, 350, Hummel, the Dyeing of Textile Fabrics, 349.

Habitat.—The Cochineal insect was first discovered by the Spaniards in Mexico in the year 1518, but it was not made known to Europe until 1523. At first it was supposed to be a seed, but in 1703 Leeuwenhoek showed it to be an insect. In Mexico it is particularly abundant in the provinces of Oaxaca and Guerrero. It occurs in many localities in Central America, and for long has been one of the most important articles of export from Guatemala, but it is met with also in South America, and recently it has been found (or perhaps only an allied insect) in the West Indies and in the southern portions of the United States.

HISTORY AND INTRODUCTION.—The immense importance of the trade, early established in this insect, led to efforts for its propagation in other countries, and for many years this has been profitably prosecuted in Teneriffe, the Canary Islands, Java, Algeria, and to some extent even in Spain. According to some writers the best quality now comes from Honduras. The attention of the Court of Directors of the East India Company was directed to this subject by Dr James Anderson of Madras in 1756. He forwarded to Sir Joseph Banks samples of a dye-yielding insect which was proved to be a species of *Coccus*, but not *Cochineal*.

HISTORY.
1459

species of *Cactus* or *Opuntia*. On the China and Manilla species of the Nopal, and even on that from Kew, the survivors began to die fast. It
 fortu
 they
 Neils
 seen
 plant
 Des

COCCUS
cacti.

The Cochineal Insect.

HISTORY.

to the discovery of America, and therefore no Cactus can be called indigenous to India. This is more than a quibble as to the correct usage of a scientific term. If the Coccus sent to Sir Joseph Banks, one hundred years ago, was found feeding on a Cactus, it must be regarded as but an earlier introduction than the Cochineal brought to India by Captain Neilson. It therefore seems probable that the Portuguese (or whoever introduced the *Opuntia*) may have intentionally or unintentionally brought the Cactus-feeding Coccus also. In 1848 Dr Dempster addressed a letter to the Governor General of India which afterwards appeared in the Journal of the Agri-Horticultural Society. He there extols the superior quality of the dye obtained from "the native" or "indigenous" insect as compared with the imported. "The quality," he says, "of native Cochineal which I found capable of dyeing a certain weight of woollen cloth proves that the indigenous insects contain an

Jullunder Doab "as to become a nuisance, and rewards were offered for its extermination, which, however, were rendered unnecessary shortly after, as a large number of insects of some kind of Coccus appeared and soon effected the destruction of the plant, which is now only occasionally to be met with"

"The Cochineal of India enters into

" "

species of *Opuntia*; but as we have abundance of the South American plant, *O. cochinchinensis*, that species may also be tried along with the several sorts of our own "

"The Cochineal of India enters into

"The Cochineal of India enters into
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ind
the
nd
uld
the

to feed upon a sp
be allied to the C
feeding on Tamar
exudation known as Manna

THE INTRODUCTION OF THE *OPUNTIA* OR PRICKLY-PEAR.—The above remarks may be accepted as disposing of the question of "the indigenous cochineal insect which feeds on the common prickly-pear." If not indigenous then, as an acclimatised insect, has it deteriorated after

C. 1460

Reintroduction of the Cochineal Insect.

COCCUS
cacti.

the lapse of 100 to 150 years? Perhaps the further question may also be suggested—was the insect derived from the best stock? If unfavourable answers have to be given to these enquiries, then it would remain to be ascertained by actual experiment whether an improved and fresh stock

Madras
Cochineal
Plant.
I461

Europe, and at the same time the head quarters of the acclimatised *Opuntia*. The sudden appearance and disappearance of a *Coccus* in the Panjab, mentioned by Mr. Baden Powell, would justify the conclusion

Panjab
Cochineal
Plant.
I462

Bombay
Cochineal
Plant.
I463

MODERN EFFORTS TO REINTRODUCE THE COCHINEAL INSECT.

I464

Grana sylvestris. A voluminous correspondence has ensued since 1795 as to the desirability of introducing the superior quality, which fetches (from its greater amount of the tinctorial principle) three times the price

COCCUS
cacti.

Forms of Cochineal.

paid for the wild insect. As late as 1882, the Madras Government had this subject brought to its attention, and instructions were given that

FORMS OF COCHINEAL.

definite opinion than that a superior or an inferior cochineal was found
scarcely detectable. The old name is still the designation of having
scientifically established
the system of the

1845, sundry attempts were made by the late M. Bunt and others, after considerable expense incurred, and a heavy amount of correspondence, as usual in such cases, the whole ended in smoke" (*Fl Bomb Supp*, 40)

GRANA FINA AND GRANA SYLVESTRIS.—Humboldt was, perhaps, the earliest observer to distinguish "the *fine* from the *silvester* or wild sort of cochineal." The former insect, he says, is mealy, or covered with a white powder, while the latter is enveloped in a thick cottony substance which prevents the rings of the insect being seen. The *Grana fina* is reported to be a native of Mexico, and the *Grana sylvestris* of South America. Dr Balfour remarks, "It has been mentioned that at Vizagapatam

Grana Fina
I465
Grana sylvestris
I466

Red-flowered
Opuntia
I467

Yellow-
flowered
Opuntia.
I468

yellow flowering prickly pear or 'Opuntia' I have seen it tried at Benary and fail." Commenting on this, Mr Liotard remarks (and he has been followed by several more recent writers) "Regarding the future in India, it may be well to lay stress on the statement made by Dr Balfour that

C. I468

Peculiarities of the Cochineal Insect.

COCCUS
cacti.

the true cochineal insect only destroys the prickly pear plant with red flowers and few prickles, and will not propagate on the yellow-flowered plant or *Opuntia*." Again, "as regards the Peninsular, we learn from Dr. Balfour that not only the *variety* (*sic*) of plant required but the superior *species* (*sic*) of the insect also exists in parts of the Madras Presidency." Although Dr. Balfour's remark as to the existence of the true

can
be
on
If
Balfour be correct in the statement that the latter insect does actually

Steps to be

on the red-flowered cactus is or is not a race derived from the true cochineal insect, perhaps more ancient than Captain Neilson's stock. The position assumed by Mr. Liotard of urging the extended cultivation of

1469

fostered in anticipation of the arrival of a fresh importation. Degeneration, if established, might be accounted for by an originally semi-domesticated creature having been allowed to run wild for a century or more, or from having been forced to feed on the wrong plant. Mistakes may thus be made, but the course indicated would most probably prove the most direct, and it may happen that we possess a long-acclimatised stock which, under careful treatment, would prove more hopeful than any insect that might now be introduced.

1470

COCCUS
cacti.

Propagation of the Cochineal Insect.

Male.
1471

"The male also adheres to the plant, and in about 12 days becomes enveloped in a cottony cylindrical purse, open at the bottom; the insects huddle together one upon another to form a mass, with their heads out."

Female,
1472

They appear generally
mouth are quite sunk in
"are almost covered by

may be detached from the plant at the first sign of the female, and ed on her ex-
cording to the
indicate the

Cochineal
nesting.
1473

At the moment of her fixing upon the plant, of a mouth she has introduces into the which is her excessive again. After shed- become a mere shell, female commences to shed her young that measures are taken to remove the young to other cactus leaves. A nest is formed, in the shape of a sausage or purse, of cotton gauze or other tissue pierced with small holes, in which 8 or 10 of the females are put, and the purse is fastened at the bottom of a leaf of cactus. The mother produces above a hundred young ones; but the mor-
tality is great, and three or four mothers are required to cover one side of a cactus leaf with sufficient young for cultivation."

1474

PROPAGATION.

In an interesting pamphlet written by I. S. C. O. and published by the Government, much useful information has been brought together regarding the various systems pursued in America and other countries in the propagation both of the insect and the plant. We cannot afford space to deal with this subject, and must accept the above abstract of the

C. 1474

The Cochineal Dye.

COCCUS
cacti.

life-history of the insect is indicating the great governing factors with
 lead in another
 The following
 useful "The
 to which the

Collection
I475

leaving only one or two of these insects on the branches is fatal to the health of the plant " "The cactus cannot bear much water when not strengthened with manure " "When a plantation is reserved for the production of a winter crop, the leaves should be covered with cochineal in the month of October or November, by planting the young cochineal at this season it ripens, and is ready for gathering at the latter end of February or of March Another part of the plantation is reserved for receiving the seed at this season, but as the plants cannot be forced to bud during the winter, the seed must be planted in March upon last year's leaves, which have the disadvantage of being tough for the insect, and this renders a winter crop more precarious than one obtained in summer " Wind and rain are very destructive hence a region with a pronounced rainy season would either be unsuitable or the seed-stock at least

Propagation.
I476Suitable
Climate
I477Treatment of
Crop
I478DYE
I479

COCHINPAL DYE.

Mr Wardle, in his recent *Report on the Dyes of India*, mentions experiments performed by him with several samples. Of a Hyderabad sample he says, it "appears to be very good" "The Government report, in which reference is made to it, is by Major W Tweedie " "It would be interesting to ascertain whether the cochineal is produced in the Hyderabad Residency, or is imported from South America " Of

sists of insects matted together by some dark-coloured substance " Both samples small and poor " Reference has already been made to Dr Dempster's report on cochineal from the lower North-Western Himalayas He says "It is beyond all doubt a true *Coccus cacti*, and

and further, at the word cochineal is not the Mexican insect Dr Dempster continues "In the month of December the young brood were extremely numerous, very lively, and ready to leave the mother and spread themselves over the plant Sulphate of alumina, added to an alkaline solution of the colouring matter of the native (sic) cochineal,

C. I479

COCCUS
cacti.

The Cochineal Dye.

1480

Europe-dyed scarlet broadcloth" "I find here an imported cochineal
has got from Bombay the name of the

cloth proves that the indigenous insects contain an amount of colouring
matter not inferior to the fine Mexican cochineal." This statement is
so completely at variance with the opinions of all other European writers,
that the

in this village are lined with magnificent specimens of the cactus, far
superior to any I have seen since I left Ludianah, and their leaves are
covered with the cochineal insect, which, it strikes me, attains here, prob-
ably from good feeding, a larger size than I have ever seen it do before.
As I passed these hedges of the prickly pear, numerous Kashmiris were
scraping the cochineal with a blunt iron instrument from the surface of
the leaves into
asking them wh
to the Amritsar
sir (21b) of the

1481

seen by Dr Fleming was the *Grana sylvestris*.

1482

that weight. These two figures are almost alternately given by different
writers—a fact which may be accounted for by the larger or smaller size
of the different breeds of insects

It is little
erly much em-
ced by the use
duction of the
Two different
shades of red are obtained from cochineal, namely, a bluish red, called

C. 1482

Cochineal as a Medicine.

COCCUS
cacti.

crimson, and a yellowish or fiery red, called *scarlet*. Wool mordanted with 2 per cent of bichromate of potash and dyed in a separate bath receives a good purple, the colour being darkened by the addition of sulphuric acid to the mordant. Mr Hummel gives particulars of the dyeing for crimson or scarlet. Wool to be dyed the former colour is mordanted with aluminum sulphate and tartar, the dyeing being effected in a separate bath. There are other methods, but the above is perhaps the best. Lime-salts are not beneficial. The latter shade is produced by the acid of stannous salt and cream of tartar or oxalic acid. The mordanting may be performed separately or along with the cochineal.

Wool dyeing
1483

For silk the mordant is alum, to be worked into the fabric for half an hour and steeped overnight. The fabric is then washed and dried and dyed in a separate bath. This gives the crimson. For the scarlet, after boiling and washing the silk is first grounded with a light yellow produced with soap and arnatto and thereafter washed. For darker shades soap should not be used. In both cases the fabric should be mordanted by the same process as described or the crimson, only using nitro-muriate of tin in place of alum. By the aid of iron mordants fine shades of lilac may be obtained.

Silk dyeing
1484Pigments,
1485

part amber, and 2 parts linseed oil

(For Ammoniacal Cochineal see under paragraph of Chemistry)

COCHINEAL AS A MEDICINE

Medicine.—Cochineal is used mainly as an agent for colouring drugs, but it is supposed by some to possess anti-spasmodic and anodyne properties.

MEDICINE
1486

Chemical Composition.—As far as has been determined, cochineal and lac owe their tinctorial properties to an acid apparently identical in character. This is formed within the body of the female insect. The chemical examination of this substance has revealed somewhat conflicting results—a fact which has led certain writers to presume that its composition varies. Pelletier and Gaventon isolated the acid from cochineal and called it carmine, a nitrogenous compound which they expressed by the formula $C_{14}H_4NO_8$. Subsequent observers (Arppe, Warren de la Rue, Hugo Müller, &c.) showed it to be an acid, and found that, in a perfectly pure state, it does not contain nitrogen, though accompanied by nitrogenous matter which it is difficult to separate from it. John named the colouring principle cochinin. The acid of the authors named has been expressed as $C_{14}H_{11}O_8$, but the crystalline carminic acid isolated by Dr Schützenberger is given as $C_7H_5O_6$, the same substance being expressed by Dr Schaller as $C_7H_5O_6$. Most recent writers give its formula as $C_{17}H_{11}O_{10}$ (Crookes). It may be separated from cochineal by precipitating its aqueous extract with plumbic acetate and decomposing the washed precipitate with sulphuric acid. The solution thus obtained is alternately precipitated, and the precipitate decomposed, a second and a third time in a similar manner, employing, however, hydric sulphide to effect the final decomposition. The filtered solution is evaporated to dryness, the residue dissolved in alcohol, and the crystalline nodules of carminic acid

CHEMISTRY.
1487

COCCUS
cacti.

Trade in Cochineal.

obtained on allowing this solution to evaporate treated with water (*Miller, Elements of Chemistry, P III, 690*) This same substance has been found in the flowers of *Monarda didyma* and probably in other plants. Pure carminic acid is a purplish-red substance, which, when reduced to a very fine powder, is bright red. Its crystals taste decidedly acid, it is very soluble in water. It may be heated to 136° without melting. It may be dissolved in ether and treating the residue with successive portions of boiling alcohol, which on cooling deposits a part of the carminic acid and yields the remainder by

solution unless some ammonia be next added, when carmine lake is thrown down. Neutral alkaline salts turn carminic acid to violet, while the acid salts of alkalies (bitartrate of potash, for example) render the shade more of an orange.

The chemical history of the carminates is, however, incomplete. The alkaline carminates are soluble, the others, as far as has been ascertained, are amorphous substances. The different results obtained with cochineal

1488

For further particulars see Carmine

1489

TRADE IN COCHINEAL

The Madras Government exported in September 1797, 21,744lb. From the reports of the sales of Indian Cochineal during the years 1797-1807, 55,196lb were sold at an average of 1s. 6d. the more than the prime cost. The price fell in 1807 that during the past seven years it has been 1s. 6d. in England, but that from the London Company of profit to the Company. The propriety of discontinuing the purchase or reducing the price to be paid to the producers. The home authorities, with the view of still further fostering the industry, directed the

C. 1489

The Lac Insect.

COCCUS
lacca.

I490

trade been destroyed by aniline that a large quantity of lac-dye was recently thrown into the Thames as worthless and unsaleable (For the trade in lac-dye see a further page)

Coccus lacca, Kerr

I491

THE LAC INSECT, *Eng*, LAQUE, *Fr*, LACK, *Germ*, LACCA, *It*
Vern — *Lakh HINO*, *Guld*, BENG, *Laksha SANS*

India and occurs
especially Butea
a complete list of

I492

DESCRIPTION AND MODE OF GROWTH — Lac is the resinous incrustation formed on the bark of the twigs through the action of the lac insect. When the larvæ or grubs of the *Coccus lacca* escape from their eggs they crawl about in search of fresh sappy twigs. When satisfied, they become fixed and form a sort of cocoon by excreting a resinous substance. The male cocoon is oval in shape, the female circular. For about 2½ months the insects remain within their cocoons in the lethargic state but

it at once commences to crawl over the females. The impregnated female after depositing her eggs below her body, commences to construct cells round each with as much precision as the bee forms its comb.

the resinous excretion—lac—which it encrusts around itself. As time advances further changes are visible, the body of the female enlarges considerably and becomes brilliantly coloured. The red colour is due to the formation of a substance intended as food for the offspring. The eggs germinate below, and the larvæ, eating their way through the body of the mother, make their escape to repeat this strange history.

C. I492

COCCUS
lacca

Trees on which the Lac Insect feeds

1493

TREES ON WHICH THE LAC INSECT IS REPORTED TO FEED

- 1 *Acacia arabica*, Willd (LEGUMINOSÆ) The *Bibul* or *Kikar* (*Gamble*, 151) "In Sind and Guzerat yields large quantities of lac"
- 2 *Acacia Catechu*, Willd. (LEGUMINOSÆ)
- 3 *Albizzia lucida*, Benth (LEGUMINOSÆ) *Silkori*, BENG
- 4 *Alenrites moluccana*, Willd (EUPHORBIACEÆ) The *Akrot* of the plains, introduced from Malay, now almost wild, especially in South India
- 5 *Anona squamosa*, Linn (ANONACEÆ) The *Ata*, a tree introduced from the West Indies
- 6 *Butea frondosa*, Roxb (LEGUMINOSÆ) The *Dhak* or *Palas*
- 7 *Butea superba*, Roxb (LEGUMINOSÆ) A climber, scarcely distinguishable from the tree *B frondosa*, except by its habit
- 8 *Carissa Carandas*, Linn (APOCYNACEÆ) Var. *spinarum*, sp, A DC
- 9 *Celtis Roxburghii*, Bedd. (URTICACEÆ) Eastern Bengal, Central and South India
- 10 *Ceratonia Siliqua*, Linn (LEGUMINOSÆ) The *Carob Tree*; now almost naturalised in the Panjab and South India,
- 11 *Croton Draco*, Schlecht (EUPHORBIACEÆ)
- 12 *Dalbergia latifolia*, Roxb (LEGUMINOSÆ)
- 13 *Dalbergia paniculata*, Roxb (LEGUMINOSÆ)
- 14 *Dichrostachys cinerea*, W & A (LEGUMINOSÆ) The *Vertuli*, a shrub of Central and South India
- 15 *Dolichandrone Rheedii*, Seem (BIGNONIACEÆ). A small tree of Burma and the Andaman Islands
- 16 *Eriolana Hookeriana*, W. & A (STERCULIACEÆ)
- 17 *Erythrina indica*, Linn (LEGUMINOSÆ)
- 18 *Feronia Elephantum*, Correa (RUTACEÆ)
- 19 *Ficus bengalensis*, Linn (URTICACEÆ)
- 20 *Ficus comosa*, Roxb, in Assam
- 21 *Ficus cordifolia*, Roxb (*Gamble*, 335) Assam Lac
- 22 *Ficus elastica*, Bl The India rubber Tree (the *Ev*)
- 23 *Ficus glomerata*, Roxb
- 24 *Ficus infectoria*, Willd The *Pikar* or *Krol*
- 25 *Ficus laccifera*, Roxb (URTICACEÆ) A native of Sylhet the *Ruthal But*
- 26 *Ficus religiosa*, Linn The *Aswat* or *Pipal*.
- 27 *Garuga pinnata*, Roxb (BURSERACEÆ) The *Garu* or *Kaikar*
- 28 *Kydia calycina*, Roxb (MALVACEÆ) A small tree the *Pala*
- 29 *Lagerstromia parviflora*, Hook f. (LYTHRACEÆ) The *Bikli* or *Sid*
- 30 *Mangifera indica* Linn (ANACARDIACEÆ) The *Mango*, in its wild state, often yields lac
- 31 *Nephelium Litchii*, Camb (SAPINDACEÆ) The *Lichi*
- 32 *Ougeinia dalbergioides*, Benth (LEGUMINOSÆ) The *Sundan*
- 33 *Prosopis spicigera*, Linn (LEGUMINOSÆ) The *Jhand* of the arid zones of the Panjab and Guzerat
- 34 *Pterocarpus Marsupium* Roxb (LEGUMINOSÆ) The *Biya* or *Kino* tree, a native of Central and South India
- 35 *Pithecolobium dulce*, Benth (LEGUMINOSÆ) The *Dikhun babill*, a tree introduced from Mexico
- 36 *Schima crenata* Kerth (TERNSTROMIACEÆ) An evergreen tree of Burma

C. 1493

Uses of Lac.	COCCUS lacca.
37. <i>...</i> - <i>...</i> of the	
38. <i>...</i> case rapid	
39. <i>...</i> lac-	
40. <i>...</i> (Mangrove) The <i>...</i> a native of	
41. <i>...</i>	
42. <i>...</i>	
43. <i>Zizyphus zizyphora</i> , Willd. (RHAMNACE). The <i>Kat-ber</i> .	
PROPERTIES AND USES OF LAC.	
After the larvæ escape, the old encrusted twigs are removed and cut up into pieces 4 to 6 inches long. These form <i>stick-lac</i> . They are spread upon a flat floor and a roller passed over them by which the resinous	
	Stick-lac. 1494
	Lac-dye. 1495
	Seed-lac. 1496
	Shell-lac. 1497
	Sheet-lac. 1498
	Button-lac. 1499
	D C
	1500
	Liver.
	1501
	Native
	Orange
	1502
	Garnet.
	1503
	Native-lac.
	1504
	Adulterated
	Lac
	1505

COCHLOSPERMUM
Gossypium.
Lac Dye White Silk Cotton Tree.

smell on crushing the lac. The writer was once informed by a merchant that his firm in the usual course of business imported very largely resin which he believed was used up by the native dealers in adulterating the lac which they and other merchants exported. The gentleman in question condemned strongly the process of adulteration, but justly remarked that resin was an ordinary article of trade used for other purposes which if they discontinued to import would only be more largely imported by other firms.

USPS OF LAC—In India lac is dissolved in native spirits and coloured, in this form it is used as a varnish for carpentry and furniture, mixed with sulphur and some colouring agent, it is formed into the sticks *batti* like sealing wax, which are used by the toy makers to coat their wooden wares. In Europe it is largely made into *sealing wax* and dissolved in spirits, it forms *spirit varnish*. It is made into *cement* and into lithographers ink, and is used to stiffen hats and other articles constructed of felt.

Varnish
I506
Batti
I507
Sealing-wax.
I508
Cement
I509
Dye
I510
LAC DYE

Having now indicated the main features of the lac industry collectively, the present article may be concluded by dealing in greater detail with the subject of the dye extracted from *Coccus lacca*. The reader is referred for further particulars regarding the European industry and trade in the Resin to the article **LAC**.

information regarding its use in the North West Provinces. Owing to the existence of the resinous matter mechanically mixed with the dye, lac is not so easily worked as cochineal. All the reactions and processes

I511

extent in India, the article is scarcely, if at all, exported

COCHLOSPERMUM, *Kunth ; Gen Pl, I, 124, 971.*

I512

Cochlospermum Gossypium, DC, Fl Br Ind I, 189, Bixinet

SOMETIMES CALLED WHITE SILK COTTON TREE!

C. I512

White Silk-Cotton Tree.

COCHLOSPERMUM
Gossypium.

Syn —BOMBAX GOSSYPIUM, Linn Roxb, Fl Ind, Ed, C B C, 515

$$V_{\text{eff}} = 1 \quad 1 \quad 1.2 \quad 2 \quad 1 \quad 1 \quad 1 \quad 1.2 \quad 1.5 \quad 1.7 \quad 1.9 \quad 2.1$$

For the Gum—**Moodeen Sheriff** gives the following *Nat ka katra*, *nat ka katra gond*, *DEC*, *Hindi katra*, *HIND*, *Tanaku pushin* **TAM**, *Konda gogu-banka*, *konda gogu pushnu*, **TEL**; *Shima pangi pushu*, **MLA**.

For the Cotton — *Pili kapas ki rui, katlér ki jhar ki rui*, DEC , *Tanaku-parutti*, TAN , *Konda eógupatti*, TEL , *Shima pangar parutti*, MAL

Reference is made to the fact that the Commission has not yet received any information from the Government of the United Kingdom regarding the proposed amendments to the Convention on the High Seas.

Habitat—A small deciduous tree, with short, thick, spreading branches; grows in forests at the base of the North-Western Himalaya from the Suley eastward to Central India, Bundelkand, Behar, Orissa, and the Deccan, also in the Prome district of Burma. Commonly planted near temples. When the tree is devoid of leaves (in March to April) it bursts into its handsome large yellow flowers, its pendulous, pear-shaped fruits ripening before the new leaves appear.

Gum—This is often sold in the bazaars of India as *kutira* or *kothira*

**GUM
1513**

doubtless be employed to impart a polish to tasar silk

Stewart remarks "The *káfira*, of which to maunds are stated by *Davis' Trade Report* to be imported annually *via* Peshawar, must be entered by mistake, or be the product of a different plant" (Doubtless the true *katira* or *Trigonanth—El*) "And, oddly enough, the same authority gives 50 maunds of this substance as exported from Ludhiana

COCO or COCOA.

The White Silk-Cotton Tree.

GUM.

FIBRE.
Floss
1514

R4 per maund, retail or bazaar, 3 annas per pound of the worst or black variety, wholesale, R3 per maund, retail or bazaar, 2 annas per pound "

Fibre.—The seeds possess a short but very soft and elastic floss, from which fact the plant has received its specific name. This floss is much too short to be of any service as a textile fibre, but, with the flosses of *Bombax malabaricum*, *Eriodendron anfractuosum*, and *Calotropis gigantea*, it has been classed as a "silk cotton." By some writers these have recently been designated "kapok fibres," but there is every reason to believe that the true kapok of the Dutch upholsterers is the floss of *Eriodendron anfractuosum* (see Vol I, B 641). In some parts of India the floss of this tree is collected and used for stuffing pillows, for which purpose it would seem better suited than the floss from *Bombax malabaricum*, as it is not so liable to get matted. It might be found serviceable as a gun-cotton. (Conf with C 175 and Kapok in a further volume.)

Bark
1515

The Rev A Campbell states that the Santals prepare a good, useful cordage fibre from the bark of the tree. In the report of the Conference held on Indian fibres, at the late Colonial and Indian Exhibition, it is stated that Mr Campbell's fibres from this tree were much admired, the floss being viewed as possessing the merit of elasticity—a merit which might allow of its competing favourably with the true kapok.

OIL.
1516

Oil.—The Rev A Campbell, Santal Mission, Chutia Nagpur, de-
nabundance
seeds is well
his Oil and
beyond the fact
of the

MEDICINE.
Gum
1517Floss.
1518

Medicine.—The gum has the properties in a mild degree of *Tragacanth*, for which it is proposed by Moodeen Sheriff and others as a substitute. It is also used as a mild demulcent in coughs. The floss has been recommended as admirably suited for padding bandages, splints, &c, being soft and cool. On this account it has been suggested as suitable for pillows and cushions used in hospitals, &c. Irvine (*Mat Med*, Patna, p. 78) says the dried leaves and flowers are used as stimulants.

TIMBER.
1519

Structure of the Wood.—Extremely soft, grey, but has no heart wood, and is not apparently put to any useful purpose, weight 17lb per cubic foot.

Cockles, see Molluscs (edible)

Coco or Cocoa, see *Cocos nucifera*; Coca, see *Erythroxylon* and Cocoa Nibs, see *Theobroma*

C. 1519

The Cocoa nut Palm	COCOS nucifera.
COCOS, <i>Linn</i> , <i>Gen Pl</i> , III, 945	
Cocos nucifera, <i>Linn</i> , <i>Brandis</i> , <i>For Fl</i> , 556, PALME	
THE COCOA-NUT PALM, THE COIR or COCOA NUT FIBRE; PORCUPINE WOOD; COCOSER, <i>Fr</i> , COCOSNUSS, KAIR, <i>Germ</i>	
Vern — <i>Nerel</i> , <i>nāriyal</i> <i>nar</i> " " " <i>nāriyal</i> , <i>dab</i> , <i>naraket</i> <i>HEB</i> <i>yal</i> , <i>jhada</i> <i>narval</i> , <i>GUJ</i> , " <i>nar</i> , <i>naural</i> , <i>BOMB</i> , <i>Na</i>	
Dr <i>JAVA</i> <i>Coconut</i> (Kanna) - <i>Coconut</i> -	
OIL, COCOA NUT OIL— <i>K</i>	
WATER— <i>Yelnir ka-pani</i> , <i>DUK</i> , <i>Yella nir</i> , <i>TAM</i> , <i>Yella niru</i> , <i>TEL</i>	
TODDY— <i>Nardli</i> , <i>HIND</i> , <i>Nardli ki-sindi</i> , <i>narullie</i> , <i>DUK</i> , <i>Tenga kallu</i> , <i>tennan-</i> <i>kallu</i> , <i>tennang kallu</i> , <i>TAM</i> , <i>Tenkaya kallu</i> , <i>tenkala</i> , <i>TEL</i> , <i>Nargalie</i> , <i>nargilli</i> , <i>ARAB</i> ; <i>Tariye-nargal</i> , <i>PEES</i>	
FIBRE— <i>Coir</i> (See first paragraph of chapter on Coir). <i>HIND</i> ; <i>Tennam nar</i> , <i>TAM</i> , <i>Tenkaja nar</i> , <i>TEL</i>	
COCOA NUT CABBAGE— <i>Tennam kurtu</i> , <i>TAM</i> , <i>Tenkala gurru</i> , <i>TEL</i> , <i>Naral ka krute</i> , <i>ARAB</i>	
COTTON or TOMENTUM— <i>Tenna marutta pungu</i> , <i>TAM</i> , <i>Tenkala-chettu puthie</i> , <i>TEL</i> , <i>Tennam</i> <i>paṭṭa</i> , <i>MAL</i>	
References—	

COCOS
nucifera.

The Cocoa-nut Palm.

L. 1071. C. COLUMBICENSIS, 11, 366.

Habitat.—A pinnate-leaved palm, with a straight or often gracefully curved stem, marked by annular scars; cultivated throughout tropical India and Burma, especially near the sea-coast. On the eastern and western coasts it is particularly abundant, more so towards the south. There are

Indian
Region,
1521

for example, is little more than half a mile from the beach. In very exceptional circumstances, or under the most careful garden cultivation, it

Brahmaputra, and the Malabar and Coromandel coasts. In the Brahmaputra valley it ascends to a greater distance from the sea than in the Gangetic; but in both it is an introduced tree, as it nowhere occurs in forests far away from human dwellings. On the Malabar coast, and on the islands off the coast of India, it may be different; but even in these localities it rarely exists as a forest tree, although it is self-sown. It is abundant on the Laccadive Islands, and on the Nicobar group in the Bay

The Cocoa-nut Palm.

COCOS
nucifera.

geographical and physical conditions were different from those of our day."

CULTIVATION OF THE COCOA-NUT.

CULTIVA-
TION

It is commonly reported that there are in India 480,000 acres under the cocoa-nut. A number of passages from Indian authors will be found scattered through the present account of the palm, which every now and again recur to the question of its cultivation. It may, however, be desirable to give here a brief abstract of the opinions published by the better known European writers, since from these may be gathered the results of scientific experiments.

SOWING—Ripe nuts, carefully collected, should alone be employed as seed, and for this purpose they are usually gathered from February to May. Seed from very young or very old trees should be avoided. After having been kept for a month to six weeks they should be planted

Sowing
1522

inches of their surface exposed. Ashes, or ashes and soil, should be freely placed in the trenches, these act both as a manure and as a preventative against insects. The seed-bed thus prepared should be kept moist, but not soaked. The germinated seeds may be transplanted when they are in their second to their sixth or even twelfth month. In the Godavari district they are placed in their permanent positions when three to four years old. In damp localities the transplanting may be done in the hot

• plant-
ing the
deepTransplant-
ing
1523

in cold dry soils these pits should be lined with sand. In marshy land, walls should be constructed around them. Ashes are often recommended to be freely mixed with the prepared soil to be put into the pits, as this is supposed to prevent the attacks of the beetles that prove so destructive to the trees. Cultivation of turmeric, arrow-root, &c, in the pits, along with the cocoa-nuts is believed to be beneficial. The soil round the seedlings is also often kept damp by a bed of leaves, particularly such as will not en-

rains, the soil being replaced and levelled about the close of the rains. By the fourth year the stem begins to appear and has about 12 leaves; it is distinctly visible by the fifth year, when the tree has about 24 leaves. The spathes commence to be formed by the sixth year, and the stem is then 1 to 2 feet above the ground, but in exceptionally favourable climates

or not till the tenth year. After six months after sowing

The Cocoa nut Palm

COCOS
nucifera.CULTIVA-
TION

of the ashes and salts of ammonia from the urine, &c, deposited day by day in the soil"

Simmonds further says "The nuts for seed should not, on being gathered, be allowed to fall to the earth, but be lowered in a basket or fastened to a rope. If let fall, the polished cover to the fibres will be injured and collect damp about the nut, or the shell inside may be cracked and the water disturbed. These are fatal injuries, or even if the plants

"Nurseries should be somewhat exposed to the influence of the sun, though not too much heat. plants thus grown will even, though deficient in stature, be strong, and when transplanted will not fail, nor suffer from heat. The planting of the nuts should take place in January to April, and also in August provided the rains are not heavy and then the planter may expect fruitful trees to be produced when grown, but nurseries formed during the heavy monsoon will generally fail, or produce trees

is recommended to be thrown into the pits when the earth is being returned around the plants. Half sand half earth is considered the best material to fill up the pits with"

PECULIARITIES OF INDIAN CULTIVATION

The following passages from the Gazetteers will be found instructive and of value to intending cultivators as having a special bearing on India

1 In Bombay (Kolab District) — Of the liquor yielding trees of this dis

1
Bombay
1529

plant the ground is hollowed 3 or 4 inches deep, and during the dry

COCOS
nucifera.

The Cocoa-nut Palm.

CULTIVA-
TION.

in the garden is set apart for growing seed-nuts. The nuts take from

If the nuts are left to drop from the tree, which is the usual practice in Bassein, they are either kept in the house for some time and then left to sprout in a well, or they are buried immediately after they have fallen. When the nuts are ready for planting they are buried either entirely or from one half to two thirds in sweet land, generally from 1 to 2 feet apart, and sometimes as close as 9 inches. A little grass, rice-straw, or dry plantain leaves are spread over the nuts to shade them. If white-ants get at the nuts the grass is taken away, and some salt or saltish mud mixed with wood ashes and a second layer of earth is laid over the nuts. Nuts are sometimes planted as late as August (*Shrāvan*), but the regular season is from March to May (*Chaitra* and *Vaishākṣi*), when, unless the ground is damp and their inner moisture is enough for their nourishment, the nuts want watering every second or third day until rain falls. The nuts begin to sprout from four to six months after they are planted, and

the ditch round the tree, 22 pounds (4 *ṣāḍis*) of powdered dry *hṣi*

1530

mixture of cow-dung and wood-ashes covered with earth; or night-so which on the whole is the best manure. Palms suffer from an insect named *bhonga* which gnaws the roots of the tree, and from the large black carpenter-bee which bores the spikes of its half-opened leaves. When a palm is suffering from the attacks of the *bhonga*, a dark red juice oozes from the trunk. When this is noticed, a hole 3 inches square is cut in the trunk from 4 to 6 feet above where the juice is coming out, and is filled with salt, which drives away or kills the insect. To get rid of the boring bee, it is either drawn out by the hand, or it is killed by pouring into the spike *assafœtida* water or salt-water.

C. 1530

The Cocoa nut Palm

COCOS
nuciferaCULTIVA-
TION

"When the tree begins to yield, a sprout comes out called *por* or *pogi* at the bottom of which is a strong web like substance called *pisundi*. After about a fortnight the tree flowers, though few blossoms come to perfection. Many of the young nuts also fall off, and only a few reach maturity. A young nut is called *bonda*, a nut with a newly formed kernel is called *slate*, and a fully-formed nut *ndrel*. A good tree yields three or four times a year, the average number of nuts being about seventy-five (*Gas*, XIII, I, 295).

In the report of the Kathiawar District (*Bomb Gas*, VIII, p 95), there occurs a short but interesting account of the cocoa nut. At Ma

feet in diameter is cut in the rock and filled with mould. "All the trees" at

II
Madras
1531

neering the Madras Presidency from Bombay it becomes more and more plentiful. Of its abundance on the Malabar coast an opinion may be

that there are 80,000 acres under the cocoa nut. Indeed, the Malabar coast and the Laccadive and Maldive Islands are pre-eminently the seats of the Indian cocoa nut industry. The enquirer after Indian cocoa-nuts, or *coc*, or cocoa nut oil need practically concern himself with no other part of the country unless he add to these the Nicobar Islands. The last-mentioned islands furnish a very large number of cocoa-nuts, but apparently the islanders are ignorant of making oil or expressing the oil.

ports from these islands are treated as if they were produce of the main-

C. 1531

COCOS
nucifera

The Cocoa-nut Pa'm

CULTIVA-
TION

land, while the imports from the Maldives are returned as from foreign territory. Last year the Maldives the Nicobar Islands 450,000 it is not reported that they man only a small amount of copra below that which prevails on the mainland of India

1532

Imperial Gazetteer as "possessing no important trade by sea or land." It seems impossible to believe that all the coir returned under the name of "Cochin Coir" could therefore come from Cochin. Indeed, the

Cochin by sea amounted to only 689 cwt, valued at R4,134, and manufactured coir 2,777 cwt, valued at R25,339 these were all sent to Bengal or Bombay, how much may have gone by land to Madras cannot be dis-

1533

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bear fruit about the ninth year after transplantation. The expenses of cultivation are stated to be R668 for a *putti* of land,—namely, R140, being the price of 600 young plants, R48 being the value of the labour required for planting them, and R480 being the wages of labourers employed to water and tend the trees until they come into bearing. When the trees begin to bear fruit, the value of the produce of a tree, exclusive of the fibre, is estimated at about 12 annas a year, making the total value of the produce in a *putti* of land R300 (*p. 70*).

III
Mysore
1534

III. In Mysore "there are four varieties of the cocoa nut 1st, red, 2d, red mixed with green, 3rd, light green, and 4th, dark green. These varieties are permanent, but although the red is reckoned somewhat better than the others, they are commonly sold promiscuously. Their produce is nearly the same.

"The soil does not answer in the Bangalore district unless water can be had on digging into it to the depth of 3 or 4 cubits, and in such situations a light sandy soil is the best. The black clay, called *ere*, is the next best soil. The worst is the red clay, called *kebbe*, but with proper cultivation all the three soils answer tolerably well.

"The manner of forming a new cocoa nut garden is as follows. The nuts intended for seed must be allowed to ripen until they fall from the tree, and must then be dried in the open air for a month without having the husk removed. A plot for a nursery is then dug to the depth of 2 feet, and the soil is allowed to dry three days. On the *Ugadi* feast (in March) remove 1 foot of earth from the nursery and cover the surface of the plot with 8 inches of sand. On this, place the nuts close to each other, with the end containing the eye uppermost. Cover them with 3 inches of sand and 2 of earth. If the supply of water be from

C. 1534

The Cocoa-nut Palm.

COCOS
nucifera.CULTIVA-
TION

a well, the plot must once a day be watered, but if a more copious supply can be had from a reservoir, one watering in the three days is sufficient. In three months the seedlings are fit for being transplanted. By this time the garden must have been enclosed, and hoed to the depth of 2 feet. Holes are then dug for the reception of the seedlings at 20 feet distance from each other in all directions, for when planted nearer they do not thrive. The holes are 2 feet deep and a cubit wide. At the bottom is put sand 7 inches deep, and on this is placed the nut with the young tree adhering to it. Sand is now put in until it rises 2 inches above the nut, and then the hole is filled with earth and a little dung. Every day for three years, except when it rains, the young tree must have water.

saline substances. Other soils, however, are employed, but black mould is reckoned very bad. The cocoa-nuts intended for seed are cut in the second month after the vernal equinox. As soon as they are cut, they

then the young palms are fit for being transplanted. Whenever, during the two months following the vernal equinox, an occasional shower gives an opportunity by softening the soil, the garden must be ploughed five times. All the next month it is allowed to rest. In the month following the summer solstice, the ground must again be ploughed twice, and next month, at the distance of 48 cubits in every direction, there must be dug pits a cubit wide and as much deep. In the bottom of each a little previously well watered each pit. The shell be filled with earth so ng. For three months

the young plants must be watered every other day, afterwards every fourth day, until they are four years old, except when there is rain. Afterwards they require no water.

at any rate be ploughed, as the manure must be given, and as no rent is paid for the grain. On this kind of ground the cocoa-nut palm begins

COCOS
nucifera.

The Cocoa-nut Palm.

CULTIVA-
TION.

to bear in twelve or thirteen years, and continues in perfection about sixty years. It dies altogether after bearing for about a hundred years. They are always allowed to die, and when they begin to decay a young one is planted near the old one to supply its place.

"In this country, wine is never extracted from this palm, for that operation destroys the fruit, and these when ripe are considered as the valuable part of the produce. A few green nuts are cut in the hot season, on account of the refreshing juice which they then contain, and to make coir rope; but this also is thought to injure the crop. The coir made from the ripe nuts is very bad, and their husks are commonly burned for fuel.

"The crop begins in the second month after the summer solstice, and continues four months. A bunch is known to be ripe when a nut falls

six bunches,
from 60 to 70
nuts, raised
and is removed

at his expense, by a man who fixes an iron rod in the ground, and forces its upper end, which is sharp, through the fibres, by which means the

IV
Nicobar
Islands.
1535

IV *On the Nicobar Islands* the cocoa-nut palm is very abundant, although, as already stated, it exists only under recent cultivation on the Andaman Islands, but reappears still further to the north on the group of the Cocos Islands. Sir W. W. Hunter gives an interesting account of the Nicobar trade in cocoa-nuts which may be here quoted. "At present the principal product of these islands is the cocoa-nut palm, and its ripe nuts form the chief export." "The northern islands are said to yield annually 10 million cocoa-nuts, of which about half are exported. The estimated number exported in 1881-82 was 4,570,000. As this important product is six times cheaper here than on the coast of Bengal or in the Straits of Malacca, the number of English and Malay vessels that come to the Nicobars is every year increasing." "The trade in cocoa-nuts is carried on chiefly by native craft from Burma, the Straits Settlements, Ceylon, &c. Forty vessels of an aggregate tonnage of 6,270 tons visited the islands for cocoa-nuts in 1881-82." "The Administration Report for 1885-86 gives the exports as 4,510,000 nuts and 5,730 bags of copra. In that year 49 vessels, with an aggregate tonnage of 8,218 tons, obtained permission to trade with the Nicobar Islands for cocoa-nuts, &c. The same report states that there are now 112,000 cocoa-nut palms under cultivation at Port Blair.

V.
Burma.
1536

V. *Of Burma* it is reported that the cocoa-nut is "largely cultivated, and might be much more so in many places along the Arakan coast as it is in Ceylon, and as doubtless it would be but for the sparseness of population, the difficulties of approaching the coast except at a few spots, and the absence of the means of land communication between the ports and the sites fitted for the production of the trees." In the Bassein district of Pegu it

VI
Bengal.
1537

and the 24-Parganas.

C. 1537

The Cocoa-nut Palm

COCOS
nucifera.

VII. In Upper India the cocoa-nut is alluded to in many works, but

CULTIVA-
TION

VII
Upper India.
1538

forth no branches to face its violence, the cocoa, on the contrary, loves

tropical zone "

VIII Ceylon —Speaking of Ceylon cultivation Mr Treloar says — "The ripe nuts are first planted in a nursery, where they are covered an inch deep with sand and sea-weed or soft mud from the beach, and watered daily til they germinate. In two or three months a white shoot containing the foliaceous rudiments springs from one of the three holes in the end of the nut, the radicals emerging from the other two orifices opposite to the shoot, and penetrate the ground." This is not quite a correct description of the germination. The leaf-stalk of the cotyledon elongates and pushes the embryo bodily out of the seed. The blade of the cotyledon remains within the nut forming a sort of arm of attachment. The lower point of the projected embryo elongates and forms the roots, and from a slit in the cotyledonar sheath the plumule or stem makes its appearance. The "three holes" on the nut are all close together, not "opposite" as in the above description and are only spots not holes. But Mr. Treloar pro-

VIII
Ceylon
1539

ENEMIES TO THE COCOA-NUT.

It is commonly stated that if the soil be too rich a large grub with a reddish-brown head soon finds its way to the roots and into the stem. This eats its way through the tissues until the leaves turn yellow, the terminal bud withers, and the tree is killed. This appears to be the beetle known as *Butocera rubus*. "In the Straits of Malacca, the chief natural enemy of the tree is a species of elephant-beetle, which begins by nibbling the leaves into the shape of a fan, it then perforates the central pithy fibre, so that the leaf snaps off, and lastly, it descends into the folds of the upper shoot, where it bores itself a nest, and, if not speedily extracted or killed, soon destroys the tree. A similar kind of beetle is known on the Coromandel coast, and is extracted by means of a long iron needle or probe, having a barb like that of a fish-hook. By using this and by pouring salt or brine on the top of the tree, so as to

1540

1541

1542

COCOS
nucifera

The Cocoa-nut Palm: Coir Fibre.

CULTIVA-
TION

1543

more formidable is the *cooroominyo* beetle (*Butocera rubus*), which waits to pierce the tender trunk near the ground, and to deposit its eggs in the cavity whence the young grubs, directly they are hatched, begin to eat their way up through the centre of the tree to the young leaf-ends at the

1544

ted by
mity is

1545

e and

GUM
1546

GUM.

The stem of this well-known tree is in Tahiti said to yield gum. It forms large stalactitic masses, red-brown, translucent or transparent (*Spons' Encycl*) Cooke, in his report on Gum and Gum-resins, says that this gum was sent to the Madras Exhibition of 1855 from Travancore. No other author appears to allude to this gum however, and it therefore, seems probable that if produced it is met with only in certain localities. The writer cannot recollect ever having seen a gum adhering to the stems of the palm.

DYE
1547

DYE

"In a patent obtained by Mr. J. H. Baker (No 5139, March 29th 1825) the whole or every part of this tree is claimed as a dye-ware, especially the husk enclosing the fruit, and the foot-stalks of the leaves. The dye was to be extracted by water, cold or boiling, or by solutions of lime, potash, ammonia, &c., and was to serve for dyeing nankeens, blue-blacks, &c. The infusion was likewise to serve as a substitute for nut-galls in Turkey-red dyeing. The material does not appear ever to have come into practical use." (*Crookes*.)

1548

Mr. Liotard says of this dye property: "Produces a dirty-brown (*khiaki*) colour, and is a good deal used from its abundance. Lime and *chaula* are added as mordants." Drury remarks that "the shell when burnt yields a black print which in fine powder and mixed with *chunam* is used for colouring walls of houses." Cocoa-nut oil is frequently employed in certain processes sulphate of iron colour to silk pose of the coc special properties that assist the tinctorial actions

1549

The natives of India generally do not seem to be aware of the dye properties. The milk is, however, said to be used by plasterers both in India and Ceylon for a purpose that has earned the lime or colour-washes it sh For this purpose cements (see No. 1625

1550

COIR FIBRE
1551

COIR FIBRE.

The thick pericarp or outer wall of the fruit yields the valuable COIR FIBRE of commerce. The SHEATHS of the leaves are used to wrap up articles, and as paper to write upon. At the Colonial and Indian Exhibi-

Leaf-Stalks.

1552
Tomentum

1553

Coir

1554

C. 1554

The Cocoa-nut Palm Coir Fibre

COCOS
nucifera.

COIR FIBRE.

of this fibre is said to come from the Malayalam *layar* (from the verb *kayiru*, to twist) through the Portuguese corruption *coiro*. "The word

and Matting Co, Highworth, Wilts, and Messrs W I Sly and T. Wilson of Lancaster, who were the patentees of improved machinery for making

quality of the fibre,—soil climate, and proximity to the sea being important influences. But there are other considerations. Certain varieties or cultivated forms of the cocoa nut are better suited than others for the

accurate system of steeping, beating, and cleaning the fibre, completes the manipulation calculated to produce the superior qualities of coir (*Conf. with Mr Jackson's report in next para*). "The fibre appears in the market in various degrees of fineness, depending on the age at which the cocoa nut was cut and husked, and the care bestowed in steeping and cleaning" Mr. Treloar says. "The usual indications are that the commoner and coarser fibre comes from the old nuts, and the finer, lighter quality from the new, but there are, of course, essential differences in the qualities brought from each locality, and the Cochin are usually the best." "Here let it be parenthetically but emphatically remarked that any attempt to give to cocoa-nut fibre a finer hue by the process of bleaching is to destroy its quality if it be good, and if it be of common quality to make it almost worthless."

Properties of the Fibre and Season when Mature—"The Cochin has the purest hue and fetches the best price." On this account it has been customary to imitate this by bleaching. "Cocoa nut fibre is tough, elastic,

PROPERTIES
OF
COIR
1555

of the sea, but it will not stand bleaching. It gives up when confronted with sulphuric acid, chloride of tin, or any other chemicals which are

COCOS nucifera.	The Cocoa-nut Palm Coir Fibre.
PROPERTIES OF COIR.	<p>If cut earl er than this, the fibre is weak, if later it becomes coarse and hard, requires a longer soaking, and is more difficult to manufacture " Dr Buchanan Hamilton in his journal across Mysore states (I, 155) the green cocoa nuts are sold for their husks, from which fibre is extracted, but the husks of the ripe cocoa-nuts are commonly burnt for fuel (II, 50) At the same time immense quantities of apparently ripe cocoa nuts, in husk are sent to Europe, the coir from the husk being there separated, cleaned, and manufactured Mr Jackson of Ken, in the <i>Planters' Gazette</i>, describing a visit to Messrs. Chubb, Round & Co's factory, gives an interesting account of the process of husking there pursued He says "The enormous heap of husks—which, indeed is known in the locality</p> <p>Honduras), all round the coast of America and the Fiji Island Nearly all the nuts are imported in the husk or outer covering, from which, on arrival, they are stripped by men using two fine-pointed steel chisel, and who, by constant practice, become so skilful in the art that many are able to open 1,000 to 1,200 nuts per day The nuts themselves after being removed from the husks are generally sold to wholesale fruit dealers, who, in turn, supply the above passage Mr new ideas India is not furnish cocoa nuts to Eng cocoa nuts is actually use England attained a vast apparently having been kept for years on the nut These facts open up a new field of trade of which with a little assistance the Nicobar and Laccadive Islands might profitably and without fear of any rival hope to enjoy a large share</p> <p>Separation of Coir in India.—"The removal of the fibre from the shell is effected by forcing the nut upon a pointed implement stuck into the ground, in this way a man can clean 1,000 nuts a day The fibrous husks are next submitted to a soaking, which is variously conducted In some places they are placed in pits of salt or brackish water, for 6 to 15 months, in other places fresh water is used, but it becomes foul and injures the colour of the fibre. The chief point to be considered is the duration of the soaking, if it be continued too long, the fibre will be weakened, if it be curtailed, the subsequent extraction and cleansing of the fibre will be rendered more difficult The most approved plan of conducting the soaking is in tanks of stone, brick, iron, or wood, steam is admitted to warm the water By this means the operation is rendered very much shorter, The other separation of the</p>

The Cocoa nut Palm Coir Fibre.

COCOS
nuciferaSEPARATION
OF COIR.

cellular substance is separated from the fibrous portion. When quite clean it is arranged into a loose roving preparatory to being twisted, which is done between the palms of the hands in a very ingenious way, so as to produce a yarn of two strands at once."

"As the husk gets hard and woody if the fruit is allowed to become quite ripe, the proper time for cutting it is about the tenth month. If cut before this, the coir is weak, if later, it becomes coarse and hard, and more difficult to twist, and requires to be longer in the soaking pit, and thus becomes darker in colour. When cut, the husk is severed from the nut and thrown into soaking pits. These, in some of the islands, are merely holes in the sand, just within the influence of the salt water. Here they lie buried for a year, and are kept down by heaps of stones thrown over them to protect them from the ripple. In others, the soaking pits are fresh water tanks behind the crest of coral. In these, the water, not being changed, becomes foul and dark coloured, which affects the colour of the coir. When thoroughly soaked, the fibrous parts are

"taken out of the pits too
ies, if left in too long, the
with that soaked in fresh

In the Maldives (neigh-
vornor of Ceylon) cocoa-

nuts are very plentiful, and enormous quantities of both the nut and the fibre are exported to India and Ceylon. (See the further paragraph on trade in nuts.)

From what has been said in an early paragraph regarding the cultiva-

som-shoots for the manufacture of jaggery during the first two years of its production after which it may be discontinued." In the Konkan the opinion is held that "if tapped the trees become unproductive much sooner."

The "who" is a reference to the fibres which are described as be-

COCOS
nucifera.

The Cocoa nut Palm Coir Fibre.

nothing else would thrive (*Gen Admin Report, p 95*) A curious fact in regard to cocoa nuts grown on salt marshes is conveyed by the

beetle, and are found to bear much sooner than those planted in a sandy soil" (*p 182-83*)

TRADE IN
COIR
1557INTERESTING FACTS CONNECTED WITH THE TRADE IN INDIAN COIR
(*Conf with p 435*)

Although as suggested, the better class fibre is most likely not produced where tapping for the juice is practised, still it should not be for-

from

style-

ready

Cochin

coir is

a mere commercial term for all good coir wherever obtained In the Indian regions alluded to above, cocoa nut cultivation is prosecuted to a considerable extent Of Cochin (Madras), it may be said, coir is perhaps the most important article of export from that Native State, but Dr Shortt (*in his Monograph*)

mentions Cochin coir He

Laccadives, Amindivi, Ka

the passage quoted above

Round & Co do not, it would seem, use any Cochin fibre but prefer a

husk

In

indust

average

1860-

of the coir

own The

are ending

five years

This idea is borne out by the statement made by Royle that "the Laccadive Islands are famed for the good quality of the coir which is made there and exported to the Malabar coast" Again, speaking of the peculiar form of the palm grown in the Island of Kiltan, Royle observes "It requires no attention and comes into bearing early The tree is not so

quite ripe How far the exports of coir from the Malabar coast to

the Southern by

the Malabar coast

users at fixed

reference to

stitutes the re
respectively

C. 1557

The Cocoa nut Palm Coir Fibre.

COCOS
nucifera.

Government on account of the islands which he manages. No change has been made for many years in the price which is given by Government for the coir produced in the islands attached to Kánara. The returns of the coasting trade of India do not specify the amounts of coir sent from the Laccadives to Malabar, so that the somewhat interesting subject of how far the juice-extracting industry of the coast is combined with the preparation of fibre cannot be definitely learned. The following facts are however, instructive.

IMPORTS of coir (manufactured and unmanufactured) into Madras from other Indian ports—

	Cwt	R
1884-85	14,745	95,884
1886-87	13,750	81,386

EXPORTS to other Indian ports—

	Cwt	R
1884-85	186,869	12,66,356
1886-87	143,228	7,98,255

TRADE IN
COIRImports.
1558Exports
1559

Turning to the tables that give the details of these figures, it is shown that of raw or unmanufactured coir Madras receives none from British or foreign Indian ports, so that unless the Laccadives, which (as stated

Malabar district alone that "the value of exported cocoa nut products is estimated at nearly a mill on sterling annually."

In a previous page some indication of the extent of the Nicobar trade in cocoa-nuts has been given. There does not, however, appear to be any trade in coir, although it seems possible that one of the inducements that

YIELD PER NUT OF FIBRE AND PRICE

YIELD OF
FIBRE.
1560

Mr Robinson, in his *Report on the Laccadives*, states that the difference in the quantity of coir obtained from the nut is said to yield 6 coir nuts will fine island n 2lb of such y r ties, of which there are 14 to a bundle, averaging about a maund of 28lb A f

C. 1560

COCOS
nucifera

The Cocoa-nut Palm. Coir Fibre.

PRICE
1561

Mangalore candy of 560lb will thus be the produce of 5,600 nuts, and should contain about 20,000 fathoms of yarn. The actual price of coir received by the islanders is about R13 per candy. The value of the coir produce of a tree is calculated to be from 2 to 2½ annas, and that of the produce of 100 trees from R13 to 15. "The average value of the total raw produce of a tree bearing fruit would then be seven annas to half a rupee, and that of a plot of 100 trees, R45." For the nuts which they export to the Malabar coast they get from R7 to 10 per thousand, or rather 1,100, as 10 per cent is always allowed for luck in these sales. The islanders export from 300,000 to 400,000 nuts annually. The natives bring their coir to the

into the Government go
for at the rate of R21-1
candy of 640lb. After 1

Since then the average price paid for a Mangalore candy of Amceendevy and Kadamit coir has been R20-2-0 (or R23 per Calicut candy of 640lb). But for the Kilian and Cheliat coirs, which are the best, an average of R20-12-7 or R23-12-0 per Calicut candy is paid. Up to A.D. 1825-26, the Bombay and Bengal Governments took almost the whole of the coir brought from these islands, and credited the Mangalore Collectorate with R25 per candy. The price has since fallen very much during the last twenty years. It has been frequently below the price paid to the islanders, and at best has never yielded above 12 to 20 per cent profit. The average imports of coir have been from 500 to 600 candies. Mr Morris, in his account of the Godavery district, Madras, gives the following brief statement regarding the production and yield of coir—

"The cocoa-nut tree yields an excellent fibre. The quantity of fibre

Dist 70)

Spon's Encyclopadia gives the London prices of coir as "Cochin—good to fine, £19 to £25 a ton, coarse, £16-10s to £19-15s. Yarn—good to fine, £26-10s to £46 a ton, medium, £21-5s to £28-10s, common, £14 to £22 10s, roping, £18 to £24."

USES OF
COIR
1562

USES OF COIR

"The fibrous husk of the cocoa-nut is not its least valuable product, and gives rise to a very large trade, both in the East and in Europe. At first it was only used in this country (England) for stuffing mattresses and cushions, but its applications have been enlarged and its value greatly increased by mechanical processes, and in a small pamphlet issued by Mr Treloar, more than twenty years ago, he stated that its natural capabilities having been brought out, coir has been found suited for the production of a variety of articles of great utility and elegance of workmanship—table-mats, fancy baskets, and bonnets, &c. Instead of being formed into rough cordage only, and mats made by

1563

the fibre is rendered into pleasing textures and used in carpeting and for sheep-folds, pheasantries, and poultry yards, church cushions and hassocks, hammocks, clothes lines, cordage of all sizes, and string for nurserymen

C. 1563

The Cocoa-nut Palm. Coir Fibre.

COCOS
nucifera.

and others, for tying up trees and other garden purposes, nosebags for horses, mats and bags for seed-crushers, oil-pressers and candle-manufacturers, are only a few of the varied purposes to which the fibrous coating of the cocoa-nut is now applied" (*Simmonds, Trop. Agri.*, 234) The uses of coir are of course so varied and extensive that it is scarcely necessary to enter upon them in greater detail than indicated in the above passage. To the natives of India it is invaluable as lasting in a damp climate. It is accordingly universally employed in tying the bamboos used in the construction of their huts.

FIBROUS SHEATHS OF THE LEAVES AND COCOA-NUT COTTON.—A brief reference has been made to these in an early part of this article. The finer ones are used as filters and sieves, but the coarser are apparently put to no purpose, although they have been proposed as suitable for paper-making. They might be used to strengthen saddlery, and even for ladies' corsets and splints. Knox says of Ceylon that "the filaments at the

USES OF
COIR.

1564

Fibrous
Sheaths.
1565

Labelliformis (B 680) This is sometimes collected and used by the natives to stop bleeding from wounds. A good sample of it was shown at the Colonial and Indian Exhibition.

CADJANS.—"The leaves are plaited into mats and screens and also made into baskets, and combs are said to be made of the midrib of the leaflets in the Friendly Islands. In the Laccadive Islands mats are made of the cocoa nut leaf. These mats are of fine quality and much esteemed when exported. In the islands they are employed for the sails of the smaller boats." "The Singa neatly, so as to make they form the usual the Europeans."

Cadjans.
1566Fronds
1567

for fuel, their midribs, tied together, are sometimes used as brooms for the decks of ships, as the fibres of the stalk are woody, brittle, and difficult to clean" (*Royle*).

COLLECTIVE TRADE IN COCOA-NUT PRODUCTS.

enters so largely into the daily life of the people, that little or nothing can be ascertained of the actual consumption. The returns of road, river, and rail traffic throw some light on this, and the coasting trade affords another means of arriving at an approximate estimate of a certain proportion, but even these returns fall far short of establishing a tangible conception of the total local consumption. Wherever the palm grows,

COCOS
nucifera.

Trade in Cocoa-nut Palm Products.

TRADE.

growth of the trade in the cocoa-nut palm it will not be necessary to go further back than the year 1850. Royle, in his *Fibrous Plants of India*,

the following statement :—

All published Imports and Exports for 1850.

	Imports.	Exports.
	<i>R</i>	<i>R</i>
Nuts	5,24,889	10,140
Kernels	8,66,120	4,31,008
Coir and rope	2,31,934	2,84,514
Oil	76,648	1,51,843
Shells	5,970	<i>Nil</i>
Cadjans	2,990	<i>Nil</i>
TOTAL	17,08,551	8,77,505

This gives a grand total of Rs25,86,056; that is to say, less than the foreign imports of last year. To compare with the above statement of **TOTAL TRADE**, the following table of the **FOREIGN TRADE** for 1886-87 (exclusive of all internal and inter-provincial or coasting traffic) may be given :—

Foreign Imports and Exports for 1886-87.

	Imports.	Exports.
	<i>R</i>	<i>R</i>
Nuts	3,98,203	8,462
Copra (or kernels)	11,76,799	79,836
Coir (unmanufactured)	6,839	77,391
Oil (manufactured but exclusive of ropes)	1,50,701	19,14,448
Oil	7,54,515	13,24,589
TOTAL	26,87,057	34,04,726

whereas in 1850 (removing approximately the items of coasting trade) the most striking

khopra (a commercial name for the kernels) have been used in the past forty years. How far the returns of foreign trade can be accepted as an indication of total trade may be learned from the following statement

The Cocoa nut Palm			COCOS nucifera.
of the values of the coasting trade in cocoa nut products during the year 1886 87 —			TRADE.
Coasting Trade in	Imports	Exports	
	<i>R</i>	<i>R</i>	
Nuts	24 21 941	16 88 773	
Kernels (copra)	35 31 15	23 00 958	
Coir	12 20 749	9 27 302	
Oil	20 60 067	20 74 455	
TOTAL	9 33 872	69 91 488	

The table furnished by Royle for the trade in 1850 practically corre

illustration one item of this internal trade Bengal sent to Assam in 1883 84 cocoa nuts to the number of close upon two millions valued at Rs 69 000 In a like manner Bombay imports cocoa nut products from Madras Ceylon Zanzibar, &c and distributes doubtless a large pro

product. Even when this has been done a very imperfect idea will have been obtained of the value of the tree to the people of India. The mere returns of trade cannot give a just conception of the importance of a product which like the cocoa nut to a large population may be said to be the resource of wealth as well as the food drink, and occupation

TRADE IN COIR, MANUFACTURED AND UNMANUFACTURED

In all the returns of this subject care is taken to explain that these do not include ropes—coir ropes and cords being placed under a general heading with all vegetable cords

The exports of Raw Coir are however so insignificant that a false impression is likely to be conveyed. The so-called manufactured coir, which figures extensively in the returns, appears to be largely crude

COCOS
nucifera

The Cocoa-nut Palm.

TRADE

coir yarn which is dressed and employed by the European manufacturers, but of course a considerable trade is also done in mats, rugs, carpets, and other such manufactures. Glancing at the figures of the foreign trade in Coir (unmanufactured), the trade would seem to have practically remained stationary for many years past, and to be too small to justify the conclusion that India participates anything like to the extent it might in meeting the home market. The exports have averaged from 10,000 to 15,000 cwt for the past twenty years. They were last year 12,347 cwt, valued at Rs 700,000. In 1894-5 they were 12,100 cwt, valued at Rs 690,000.

exported 15,586 cwt and imported only 309 cwt. Bombay exported 1 cwt applies Of the cwt of assigned

from Madras

II. OF MANUFACTURED COIR (excluding ropes) India imported last year (18,709 cwt) valued at Rs.50,701 and exported 208,622 cwt, worth Rs.19,44,448. Of the imports, Ceylon sent 17,657 cwt, of which Bengal re-

[illegible]

mainly concentrated in the Diaspora & recently

COIR ROPES,
1560

COIR ROPES

Nothing can be learned as to the extent of the foreign and internal trade in coir ropes and cords, since the trade returns for these are published jointly with those of all other ropes. It has been said, however, that coir string is universally employed by the natives of India in the construction of their bamboo huts. For this purpose alone the consump-

The Cocoa nut Palm - Coir Rope.

COCOS
nucifera.

COIR ROPES.

It is, however, better suited for running riggings its lightness being taken advantage of. In the *British Manufacturing Industries* (on Fibres and

across the path, some of these were made of coir.

OIL.

OIL
1570

The sliced kernel, dried at ordinary temperatures, either in the sun or artificially, contains from 30 to 50 per cent of oil. The method of extracting this oil in India is as follows. The kernel is squeezed in a press the oil is found to rise to the surface and is expressed.

The climate is not so hot as in tropical countries.	is not so hot as in tropical countries.
The odour is not so agreeable as in tropical countries.	is not so agreeable as in tropical countries.
In the soap and for candles and for when fresh, it is very rancid when old.	ndles and when fresh, it is very rancid when old.

Regions where Oil is Produced — While in the above sentences a brief abstract has been given of cocoa nut oil it is necessary to deal with this subject in greater detail. Enquiries are frequently addressed to the Government of India by merchants interested in the trade in this substance, so

cocoa nut oil industry is that written by Lieutenant H. P. Hawkes and published in 1877. Gazetteer writers have contented themselves with

COCOS
nucifera.

The Cocoa-nut Palm: Its Oil.

OIL.

treating the subject as too well known to call for any detailed description, and at most only the meagrest accounts have been given. To the merchant class of the country, and to the general public, the

cocoa-nut are con-nut, oil, and today, of the juice from which sugar and spirits may be prepared. We know that in Bombay the juice is largely extracted from the tree, that in Mysore the fibre is the chief preparation, and that in Madras and Travancore enormous quantities of both fibre and oil are produced.

from the same trees or even prepared by the same cultivators—certain plants or portions of the plantation being periodically set apart for these several industries. Under coir fibre it has been said that the green or unripe cocoa-nut is alone used for that purpose, while most writers seem to agree that the ripe kernel is necessary for the oil. It would be most instructive to know if cultivation had resulted in the production of certain races of cocoa nuts famous for their oil-yielding properties, just as the inhabitants of the Laccadive Islands appear to have developed a small-fruited one with a specially good fibre. In connection with commercial reports on cocoa nut oil it is generally stated that the finest qualities are obtained from 'Cochin' (Spon places Cochin after Ceylon). It

for
oil
Pre
of
gre

peculiar cocoa-nut that would seem to be inferior to the Malabar either as an oil yielding or an edible nut. The imports from the Maldives and Nicobar Islands into Madras are very unimportant as compared with those recorded against Bengal, yet Madras, and not Bengal, appears to control the trade.

ledge of at present, or that a large proportion of the coast cocoa nuts or those of certain localities only are always or periodically set apart for oil-yielding. It may, of course, be the case that the trees are, so to speak, pruned by the removal for coir of so many green nuts from each tree, the remainder being allowed to ripen for oil purposes or as articles of diet.

This brief review, from want of definite information, may be accepted as indicating the direction that future reports might assume, but it may safely be concluded that, as with coir, so with cocoa nut oil, Madras is the

The Cocoa-nut Palm: Its Oil.	COCOS nucifera.
chief seat of the trade. Certain writers familiar only with Bengal (with	oil
on the Madras Presidency.	
<p>Mode of Preparation of the Oil.—The ripe kernel is cut out of the shell in various ways, and either dried by exposure to the sun or by artificial</p> <p>parts, or split Under to dry</p> <p>them, after which they are exposed to the sun on mats, and when thoroughly dried are subjected to pressure in an oil-press." Balfour remarks: "The</p>	1571
	1572
	1573
	Khobrel. 1574
<p>seer sior fres</p> <p>scrapings are then put in a copper vessel over a slow fire, and after boiling are squeezed; sometimes instead of boiling them the scrapings are</p>	Avel 1575
<p>in water. The pieces are then crushed in water and the whole is again boiled over a slow fire, when the oil rises to the surface and is skimmed off." It is worthy of careful observation that practically the difference between <i>dvel</i> and <i>muthel</i> oil is, that the former is made from fresh kernel instead of from copra. Dr. Shortt says: "Boiled oil is obtained by bruising the kopra or the fresh cocoa-nut, mixing it with an equal quantity of water and then boiling the mixture. As the steam evaporates the oil</p>	Muthel 1576
<p>is com- Two " In</p>	1577
<p>and is supposed, for that purpose, to be superior to oil obtained from copra. Hawkes says of the hot expression oil: "When required for edible purposes, the kernel of the fresh nut is taken, rasped and mixed with a little boiling water. This yields by pressure a milky fluid</p>	1578
	1579

COCOS
nucifera.

The Cocoa-nut Palm • Its Oil.

OIL.

which, on being boiled until all the water has evaporated, produces a clear edible oil. Only just sufficient water to moisten the pulp should be added, as a larger proportion prolongs the operation and deteriorates the product. When fresh prepared, this oil is comparatively free from smell, but speedily acquires an unpleasant odour; many attempts have been made to divest the oil of this smell, which renders it inapplicable for the perfumer's use, but only with partial success. Nearly every writer describes a different mode of preparing the oil obtained by the hot moist process. The reader is referred to a further page where this subject will be found to be dealt with under the head of *The Oil as a Medicine*.

pose or other

In the Jury Reports of the Madras Exhibition interesting information regarding the extraction and yield of cocoa-nut oil has been recorded. "Half a hundredweight of the dried kernel is a charge for a full-sized *cheeko*" (or country mortar-like oil-mill), "and a pair of stout well-fed bullocks will get through four such charges in a day, so that twenty mills are required to get through two tons in the twenty-four hours. The man who drives has usually a boy to assist him in taking the oil, which is got

the kernel burn brilliantly

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bland
ed in
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yields
in oil
brotic,
mock
veral
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ls by

In *Spons' Encyclopædia* it is stated that "Its principal fatty acid is lauro-
s'earic, together with oleic, palmitic, myristic, and some others of less im-
portance all combined with glycerine." One of the most remarkable fea-

1580

1581

C 1581

The Cocoa-nut Palm Its Oil.

COCOS
nucifera.

tures of this oil is that it will take up a larger amount of water than any other commercial oil. This makes it eminently suitable for soap-making, and but for the smell which such soap leaves on the skin the oil would be even more extensively employed by the soap-maker than it is.

Industrial and Domestic Uses of the Oil—This oil has now for many years been largely used in the candle trade. Messrs Price & Co introduced in 1840, on the occasion of Her Majesty's marriage (when for illumination a cheap self-snuffing candle was required), a new composite candle, which was a mixture of stearic acid and cocoa-nut stearine. This was subsequently greatly improved until at one time cocoa nut oil was the chief feature of Price's patent candles. The immense improvements which have taken place in the European candle industry have to some extent lessened the demand for the oil, but it is still largely employed. "It is an excellent illuminator, in both candles and lamps, as it emits no smoke."

Of no less importance is cocoa-nut oil to the soap-maker. "It forms a hard and very white soap more soluble in salt-water than any other

OIL

CANDLES
1582SOAP.
1583

water, in combination with bicarbonate of soda and other substances, and yet

vegetable butter, is capable of taking up a larger percentage of water—and still forming a hard soap—than any other known fatty matter. The soap made from it, moreover, is more soluble in saline or "hard waters," even sea-water, and from this reason it has long been made into soap called *marine soap* for use on board ship. The odour which it imparts to the skin or garment washed with it will last for several hours. The odour resembles that of infants' vomit. On this account it should never be added to the ingredients used in the manufacture of a toilet soap. It does not readily saponify with caustic soda lye by itself, but does so readily when mixed with tallow or palm oil.

A large amount of the oil is made into soap, and is sold in the form of this oil.

1584

sively used medicinally.

Prices and Yield of the Oil—Speaking of the year 1854 Hawkes

1585

January 1855 was £46 10s per ton, the average being from £46 to £48."

C. 1585

COCOS
nucifera.

The Cocoa-nut Palm: Its Oil.

OIL.

... that the "Cocoa-nut" oil is not more than the
 ... of there
 ... necessi-
 ... It may,
 however, be accepted as somewhere between 30 to 50 per cent. Hawkes
 ... No
 ... cocos-
 ... oil-mill 180lb
 ... required to
 ... d to yield

1586

TRADE IN COCOA-NUT OIL.

Royle remarks that the imports into Great Britain of cocoa-nut oil were in 1850, 98,039 cwt., of which India furnished 85,096 cwt. Hawkes states: "The oil is exported from the Madras Presidency for the most part to the United Kingdom and France, far the largest quantities being sent to the latter. The remainder is sent to Bombay, and the French (Indian) ports." In 1850, as in the present day, the cocoa-nut oil trade almost entirely centred in Madras, so that the above passages may be taken as approximately indicating the extent of the foreign demand for the oil forty years ago. In 1880-81 the foreign exports of Madras alone having in addition by 886 87 the exports 556,562, 639,637 gal. 1,000,180 gal.

R20,60,067; the exports were 1,942,809 valued at Rs20,74,455. The value of the oil exported from the various ports of India, one of

coastwise imports were unimportant. Local production added to these imports would constitute the supply from which the exports could be made, and in the case of Madras it is noteworthy that that presidency imported

C. 1586

The Cocoa-nut Palm - Its Oil,

COCOS
nucifera.

OIL.

Turning to
nd to prevail,
allons and in
il production
n these presi-

dencies. Cocoa-nut oil is thus a specialty of Madras trade

COPRA OR DRIED KERNEL

COPRA
1587

A very imperfect idea of the supply and demand for this oil would, however, be conveyed were we to omit to examine in this place the trade in copra or dried kernel, the substance from which the oil is expressed. This is largely exported to foreign countries and sent from one province of India to another to be locally made into oil.

	1884-85		1885-86		1886-87	
	Cwt	R	Cwt	R	Cwt	R
Imports . .	39,653	3,95,685	105,296	10,20,341	125,222	11,76,799
Exports . .	64,333	5,34,291	21,755	1,86,800	9,337	79,836

The imports come chiefly from Ceylon and the Straits Settlements, and are almost exclusively delivered in Bengal and Bombay, only very small amounts being received by Madras. The exports, on the other hand, go mainly from Madras (8,135 cwt of last year's exports) Bombay being next in importance. The greater part of these exports (7,149 cwt) go to Portugal, Persia, Ceylon, Russia, and Arabia, each receiving from 300 to 500 cwt. So far for the foreign traffic. The imports and exports coastwise have now to be considered. The total imports by coasting traffic were 347,255 cwt, valued at Rs 35,31,115, and the exports 236,250 cwt, valued at Rs 23,00,958. Of the imports Bombay received 219,204 cwt, Bengal 62,971 cwt, Sind 34,658, Madras 27,025 cwt. Of the exports, Madras sent to other Indian ports 182,509 cwt, Bombay 53,295 cwt, Bengal exporting only 1,000 cwt. The balance of 1,000 cwt was sent to other ports.

OIL-CAKE OF PUNAC—Before passing from the consideration of cocoa-nut oil it is necessary to say something about the oil-cake. This is viewed as an exceedingly valuable manure, especially to cocoa-nut palms grown inland. It is also largely used to fatten fowls, pigs, cows, and other

OIL CAKE.
1588

C. 1588

COCOS nucifera.	The Cocoa-nut Palm as a Medicine.
	animals It is sometimes exported to Europe In Madras it sells for 3 to 4 maunds (of 25lb) per rupee
MEDICINE	MEDICINE.
Fruit	The GREEN FRUIT is given as a refrigerant, the FLOWERS as an as-
1589	trigent, and the OIL employed as a substitute for cod-liver oil The milk
Flowers.	of the nut, the juice from the FLOWERING SPIKE, and the tomentum from
1590	the LEAVES are all used medicinally
Oil.	
1591	
Spike.	
1592	
Leaves.	
1593	
Water.	
1594	scrotum,
Edible Pulp.	THE EDIBLE PULP AND THE MILK PREPARED THEREFROM—The
1595	The following is a prescription known in Hindu medicine as <i>Narikela-</i>
	<i>Khanda</i> "Take of the pounded pulp of cocoa nut half a seer, fry it in 8
	water
	oper,
	teja.
	essa
	in tenuous purgatives (<i>Pharm Ind</i> , 247)
	The following is a prescription known in Hindu medicine as <i>Narikela-</i>
	<i>Khanda</i> "Take of the pounded pulp of cocoa nut half a seer, fry it in 8
	water
	oper,
	teja.
	essa
	ferrea (<i>naga kesara</i>) 1 tola, each in fine powder, and prepare a confection,
	Dose 2 to 4 tolas in dyspepsia and consumption" (<i>U C Dutt, Hind</i>
	<i>Mat Med</i> , 248)

The Cocoa-nut Palm as a Medicine.

COCOS
nucifera.

MEDICINE

Shell-Oil.
1599

ous used medicinally, the most convincing statements have been published both as to "cheap, hard, white ceutical purposes, liniment" (Dym this oil is inferior liniments Sakha

"A very pharma- of soap nd, says ehicle for iared for

1600

oleine obtained by pressure refined by being treated with alkalis, and then repeatedly washed and distilled with water" The therapeutic pro- "In as a rable rption oduce

1601

1602

much used as a local fevers and debilitating vermifuge in Jamaica sugar, in flux. An

C. 1602

COCOS
nucifera.

The Cocoa-nut Palm as a Medicine.

MEDICINE

I603

and pulmonary diseases generally. Pound the kernel with water, place it to settle, and skim off the cream. This is preferable to the expressed oil."

"Cocoa nut oil was proposed by the late Dr. Theophilus Thompson (*Proceed of Royal Society, 1854, Pt. III., p. 41*) as a substitute for cod-liver oil; and in this character it has been favourably noticed by Dr. J. H. Warren (*Boston Med and Surg. Journ., Vol. III., p. 377*) and others. The substance used in these cases was not the ordinary commercial oil, but the oleine obtained by pressure from the crude oil (in the solid state it is met with in England), refined by being treated with alkalis, and then repeatedly washed with distilled water. In his Lethsman Lectures Dr. Thompson gives the result of his treatment with this agent in 53 cases of phthisis. Of the first 30, 19 were much benefited, in 5 the disease remained stationary, and in the remaining 6 the disease continued to advance. Of the second 23, 15 were materially benefited, 3 remaining stationary, and 5 became worse. Dr. Garrod (*Brist and For. Med Chir Rev., Jan 1856*) has shown that it exercises a marked influence, almost equal to cod-liver oil, in increasing the weight of the body. The great advantage of its employment experienced by Dr. Thompson, Dr. Garrod, and also by the Editor, who instituted some trials with it, is, that under its prolonged use it is apt to induce disturbance of the digestive organs and diarrhoea. Its use is favourably noticed in the Report of Drs. Van Someren and Oswald, and Mr. J. Wood." (*Pharmacopœia of India*)

Dr. Dymock says cocoa-nut oil has been tried in Europe as a substitute for cod-liver oil.

general use :

with disady

and induce

formed by some writers regarding

fact that nearly every author descrit

and consequently that it is possible many different substances or a substance in many stages of purity or impurity may have been experimented with? In the Maldives cocoa-nut oil is esteemed a powerful antidote against the bite of poisonous reptiles.

THE JUICE.—The freshly-drawn juice is considered refrigerant and diuretic, and is valuable as a preparation known as toddy poultice (see below).

It constitutes one of the most tumblingful of the

on account of its

(Dymock)

tside SCRAPINGS OF THE HUSK

ise and heal them rapidly if

application was proved by the

case of two bad ulcers occasioned by the bite of a negro's teeth. The young roots boiled with ginger and salt are efficacious in fevers, the same as the bamboo" (*Royle*)

THE COTTON OR TONENTUM.—"This is a soft, downy, light-brown-coloured substance, found on the outside of the lower part of the branches of the cocoa-nut tree, where they spring from the stem, and are partially covered with white hairs. The coco blood, in cases of diarrhoea, is admirably fitted to be used with tomentum. On the surface of the bark under Tinder)

Tomentum.
I606

C. 1606

The Cocoa-nut Palm as a Medicine.

COCOS
nucifera.

THE FLOWERS —Are sometimes used medicinally, being said to be
astringent

MEDICINE-
Flowers

1607

Nuts.

1608

Roots

1609

in sore-throat

THE ASHES —“The ASHES of the leaves contain an amount of potash,
they are used medicinally

Ashes.

1601

THE BUD —The tender buds of this palm, as also of *Borassus* and
Phoenix, are esteemed as a nourishing, strengthening, and agreeable vege-
table.

Bud.

1611

Special Opinions —§ “The husk of the fruit of the *Cocos nucifera* is
used in the treatment

of male fern when tak

W Nolan M D, Bomba

acidity and gastric irritati

ed as a local application

B A, M B, Monghyr

eczema of the scrotum

ing is a popular dome

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give is from 20 to 30

daily An ash is prep

is a valuable ant-acid

sweet extract is also

(Civil Surgeon R L D

from this palm is very refreshing and possesses laxative properties

Its

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(A Civil Surgeon) “If the flowers are mixed with sugar, the root of
Alhus-khus, and white *chandana*, with a little water, the combination will
be found good in bilious fever, will check vomiting, and produce a cooling

COCOS
nucifera

The Cocoa-nut Palm - Its Edible Products.

MEDICINE.

1612

sensation" (*Civil Surgeon William Wilson, Bogra*) Useful "in dysentery, diarrhoea, menorrhoea, and stomatitis" (*Native Surgeon T Ruthim Moudelliar, Chingleput, Madras Presidency*) "*C. mamillaris*, dwarf cocoa-nut tree, Pemba, East Africa fruit large, smooth, distinctly three-cornered pinkish yellow when ripe without the fibrous pericarp of the common cocoa-nut Yields very little oil, but supplies a refreshing drink in fevers and in hot weather, and is said to produce free diuresis used when the nut is full grown, but before it begins to ripen Vern. of East Africa *Muasi C nucifera, Musi-ya Pemba, C mamillaris* (*Surgeon-Major John Robb, M D, Surat, Bombay Presidency*).

FOOD

FOOD PRODUCTS.

Under the head of food products obtained from this palm we may

Cocoa-nut
Cabbage
1613

he tree
obtain

Young Cocoa-
nut
1614

Young Cocoa-nut (VERN dab) — This is the tender fruit, plucked off the tree for the cooling, sweetish, clear water, and the soft, cream-like pulp it contains The water is drunk and the pulp eaten by natives of all classes

Mature
Cocoa-nut.
1615

Mature Cocoa-nut (VERN jhuna narkel) — This is the fruit in its mature state, with its outer, thick, fibrous covering completely dried It contains less water, but has a thicker and harder albuminous layer than the tender fruit, when dried this albuminous substance is known as copra. It is eaten with parched rice, or rasped and put into curries or made into sweetmeats Copra is either allowed to ripen and dry within the shell, when it separates naturally and is removed entire, or the shell is broken and the copra cut out and dried either in the sun or over fires The former exists in large pear-shaped pieces smaller than, but of the same shape as, the interior of the nut, and is known as "natural copra" The latter occurs as the irregularly-cut pieces known as "artificial copra" An oil is extracted from copra which is employed for various culinary purposes, and is also exported to a certain extent (For further parti-

Juice
1616

Root
1617

NUTS
1618

in pan

THE NUTS

The above is a brief abstract of the food products of this palm The extent to which the unripe fruit is cut, the water and unripe kernel being consumed and the husk made into coir, may be partly inferred from what has been already said regarding the fibre To a large population in

TRADE
In nuts
1619

and coasting trade in these nuts, as recorded in Mr J E Cooch's

ripe
1 to
1 dia
107

The Cocoa-nut Palm: Its Edible Products.

COCOS
nucifera.TRADE
IN NUTS

1,434,821, and East Africa 627,346. Of these imports Bengal took 8,430,229, valued at Rs. 1,75,552, Burma 5,618,949, valued at Rs. 3,72,702, Bombay and Madras each received 700,000, and Sind 86,800. Bengal exported no cocoa-nuts to foreign countries, but Bombay and Madras each sent about 150,000 to Egypt, Arabia, and Turkey in Asia. The foreign trade in ripe cocoa-nuts is therefore very unimportant, and but for the Maldives being viewed as foreign territory (while the Laccadives and Nicobar Islands are not), it would be scarcely worthy of notice. It is noteworthy that India at present takes practically no part in meeting the

Of the coastwise exports in 1886-87 Bengal sent to Burma, according to one official table of coastwise trade, 1,676,773, but according to another

into Burma alluded to above

JUICE FROM THE COCOA-NUT.

Dr. Hugh Oleghorn has described as follows the process of tapping the palm for its juice in Madras—a process which is essentially that followed in Bombay and other parts of the country—this palm is not tapped in Bengal. When the spathe is a month old, the flower-bud is considered sufficiently juicy to yield a fair return to the (Sánár)

JUICE
Madras.
1620

the cut end of the spathe to crush the flowers thereby exposed and to determine the sap to the wounded part, that the juice may flow freely. The stump is then bound up with a broad strip of fibre. This process

COCOS
nucifera

The Cocoa-nut Palm Toddy.

JUICE

is repeated morning and evening for a number of days, a thin layer

A single spathe will
 continue to yield toddy for about a month, during which time the Sanár
 mounts the tree twice a day and empties the juice into his *eroppetty* (a

about a quarter of a measure per tree. The length of time a tree

Bombay,
 1621

1911, 1913), and in Kandra (AV, Part I, 58, Part II, 203). According
 to the returns the writer has had access to, there are some 3½ million trees
 in Bombay, of which about 30,000 to 40,000 are tapped for their juice.

The following table shows the number of trees tapped for toddy in

in Malabar and Deogad 2½d (1 anna 8 pie) a month or 2s 6d (11½) a
 year on each tree tapped. Under the new system a special license is
 granted to tap trees, at a fixed rate for each tree, and under certain con-
 ditions as to the number of trees included in the license. The licensees

to distil,
 keepers
 juice of
 6d (12
 st of fuel
 the tap-

C. 1621

The Cocoa-nut Palm - Toddy.

COCOS
nucifera.

JUICE

ping tax he had paid to Government Government levies from the liquor shop keepers £60 (R600) a year for every hundred trees tapped. Three fourths of this the liquor-shop keeper pays, the remaining fourth he recovers from the Bhandāri who supplies the liquor. The Bhandāri's share of the tax amounts to £15 (R150) on one hundred trees for one year,—that is, a monthly charge of £1 5s (R12½) on the one hundred trees, or on each tree a monthly tax of 3d (2 annas).

In Ratnāgiri the juice from each tree (1½ seers) of juice is seldom sold raw but is turned to the liquor-shop keeper. With the wages of an assistant the monthly charge for distilling the produce of one tree is about 2d (1½ annas).

300 trees he makes a fairly good income.

Of Ratnāgiri, it is said, there are ordinarily three kinds of palm spirit, known respectively as *ras*, *phal* or *dharti*, and *phen*, *ras* being the weakest and *phen* the strongest. In some places a still stronger spirit called *divasi* is manufactured. The average wholesale rates at which for the imperial gallon, 7 pie), *phal* is 1½d (8 annas) 4s 9½d (R2 6-4).

The spirits are distilled in private stills, licensed to be kept at certain Bhandāris' houses under fixed conditions as required, in proportion to the number of trees licensed to be tapped in the vicinity. One still is usually allowed for every 100 trees, and the still-pot is limited to a capacity of 20 gallons.

Spirit

Ras.
1622
Phul
1623
Pheni.
1624

FERMENTED AND UNFERMENTED BEVERAGE

TARI.
1625

This is one of the forms of the so-called palm-wine so much extolled by the early European visitors to India. From what has been said in the preceding pages regarding the juice it may have been inferred that, if left for a short time after removal from the tree it rapidly ferments and becomes intoxicating. This is the *tari* or toddy (or in the case of the cocoa nut more specifically known as the *nira*), a beverage very extensively consumed in India. Fermentation is said to be prevented by the addition of a little lime to the fluid. The earthen vessels into which it drains are generally powdered with lime when the fluid is to be drunk in its fresh unfermented state, or is intended to be boiled down to sugar or jaggery. It is also drawn early in the morning instead of being left on the tree overday. Robinson says that they are still so strict in the abstinent manufacture of toddy would not. Self-fermented toddy is extensively used of yeast. When fermented the juice may be distilled into spirits or made into vinegar. One hundred gallons of *tari* yields on an average twenty-five of *arak* by distillation.

COCOS
nucifera.

The Cocoa-nut Palm: Sugar.

PALM SUGAR

PALM SUGAR

Instead of being fermented, the liquor may be evaporated down and its sugar thus extracted "Eight gallons of sweet toddy, boiled over a slow fire, yield 2 gallons of a lusciously-sweet liquid, which is called *jaggery* or sugar-water, which quantity being again boiled, the coarse brown sugar called *jaggery* is produced. The lumps of this are separately tied up in dried banana leaves" (*Royle*). Dr Shortt says "The sap is poured into large pots over an oven, beneath which a strong wood-fire is kept burning, the dead fronds and other refuse of the plants being used as fuel. The sap soon assumes a dark brown semi-viscid mass, well known as

pots or pan
jaggery. It

state it is sold to ~~sugar~~ contractors, sugar reners, or merchants. The sugar refined comprises several sorts, known in the market as moist, raw, coarse, and fine sugar. The *jaggery* is placed in baskets and allowed to drain, the watery portion or molasses dropping into a pan placed below. This is repeated, so that the *jaggery* or sugar becomes comparatively white and free from molasses. This sugar—for so it may now be called—is put out to dry, and the lumps broken up, when dry it is termed raw sugar, and weighs about 25 per cent. of the whole mass, the rest of it being collected in the form of molasses." Thus cocoa-nut sugar is chiefly met with in the form of *jaggery*. It is well known, however, that it is capable of being refined according to European principles, and a certain amount of cocoa-nut sugar is regularly prepared. "The success of Dr J N Fonseca (author of the *History of Goa*), in converting toddy of the cocoa-nut tree into crystallized sugar, has been hailed with satisfaction by the press at Goa, and flattering calculations are made of the advantages that will accrue to the country from the development of this new industry" (*Bombay Gazette*). A similar sugar is prepared from the date-palm, from the palmyra-palm, and from the Indian sago-palm (*Caryota urens*). The date palm is very largely used for this purpose in Bengal, and the cocoa nut and palmyra palms in Madras while in Bombay, apparently, sugar is only very occasionally made from the juices of these trees, but when extracted it is most generally prepared from the palmyra or *Caryota* palms. Some years ago the Government of Bombay, getting alarmed at the growth of the habit of toddy-drinking, brought Jessore sugar manufacturers to try the experi-

Refined.
1626

cally failed. It is not known whether or not sugar to any appreciable extent is actually prepared from the Bombay palms, nor even whether a license is necessary to tap trees for sap intended to be so used. Of the Thana district it is said "Coarse sugar or *gāl* is also made by boiling the juice in an earthen pot over a slow fire." It is worth recording that, accord-

48,000 of these occur in Kánara, 21,672 in Kolába, and the remainder in Ratnágiri.

In a recent report on the trade in Indian sugar issued by the Revenue and Agricultural Department, no mention is made of palm sugar being

The Cocoa nut Palm- Sugar.

COCOS
nucifera.

prepared in Bombay, so that it may be inferred the trees licensed to be

PALM SUGAR

	Acres
Palmyra	24,900
Cocoa nut	5,700
Date	1,600
	<hr/> 32,200

The writer of that report adds "In 1884-85 and 1885-86 the area under cocoa-nut, date palms, and palmyras was 31,000 acres and 28,000 acres

ment in 1886 it was estimated that there were 7,776⁵ acres under that palm. Taking the customary estimate of 100 trees to the acre, we arrive at the conclusion that out of a total of 7,776,500 trees, 570,000 were tapped, or

There exist
suit the gr
be tapped

made with the view to the preparation of the beverage. It would be instructive to know if the 5,700 acres of cocoa nuts in the above statement

re are
sugar

nown*
cocoa

on the
as to
sugar

making, we went fully into the matter, receiving considerable assistance from Mr D O Amesekere, a proctor who, when we last heard of him, was practising at Kur

crystallized cocoa
by smoke. The
when collected w

would render the enterprise unprofitable. What pays natives on a small scale will not pay Europeans when the matter is entered into on commercial principles. An experiment might be tried, however, labour being economised by the use of ladders, perhaps, and a larger use than the natives make in toddy drawing, of safe passages from tree to tree' (Tropical Agriculturist, 1881 87 563)

COCOS
nucifera

The Cocoa nut Palm Spirit.

CEMENT
1627

CEMENT MADE OF LIME AND COCOA-NUT JAGGERY

makes excellent cement" Drury remarks: "This jaggery is mixed with heat and bricklayers urest castor which the

seeds are boiled"

In *Spons' Encyclopædia* there occurs the following regarding Ceylon
"Amongst the uses of the burnt coral or receiving so beautiful
stinguished from the

thus subject appears to be well worthy of chemical investigation, for there seems every reason to presume that the property of this ingredient in combination with lime might, with great advantage, be employed to replace the whitewashes commonly used, to the injury of the garments of whoever may lean against walls so coloured (*Conf with opening sentences under Domestic Uses, and the account given under Dye, C. 1547*)

PALM SPIRIT OR ARAK

SPIRIT
1628

Instead of being consumed as a fermented beverage the palm wine
separate record
rest satisfied
be tapped
the method of

taxation and process of distillation generally pursued The present notice of cocoa nut spirit may therefore be concluded by the following note kindly furnished for this work —

Dr Lyon, of Bombay, has recorded some interesting details regarding the alcoholic strength of toddy from the cocoa-nut, date and brab In the following table is shown the average alcoholic strength of six night collected samples of each of the three kinds of toddy at respectively three and eight hours after collection and the average maximum alcoholic strength attained by the samples, as well as the strength of samples collected during the twelve day-hours, when examined the morning after collection —

	PROOF SPIRIT PER CENT		
	Cocoa nut	Date palm	Brab (Borassus)
<i>Night samples</i>			
3 hours after collect on	7 15	5 8	3 9
8 " " "	10 0	8 0	4 7
Maximum strength	11 9	11 0	7 9
<i>Day samples</i>			
15 hours after collect on	10 8	11 7	6 5

The Cocoa-nut Palm. Spirit.

COCOS
nucifera.

SPIRIT.

"Dr. Lyon finds that in toddy collected in pots which have previously been used, fermentation commences before the pots are removed from the tree. The toddy becomes so effervescent that it is blown out of the pots."

VINEGAR
1629

Vinegar from Palm Wine.—Nearly every writer who has dealt with the subject of the useful products of the cocoa-nut alludes to the vinegar prepared from the juice. "One hundred gallons of toddy produce by distillation, it is said, twenty-five of *arak*. Or it may be allowed to undergo the acetous fermentation and produce very good vinegar. Or instead of being allowed to ferment, the toddy may be made to yield *jaggery* or sugar. For this purpose a supply of sweet toddy is procured mornings and evenings, particular care being taken that the vessels employed have been well cleaned and dried" (*Royle, Fib Pl*)

The vinegars prepared from the juice of the various palms that yield such juices do not appear to have been carefully examined. The natives of India attribute peculiar properties to each.

STRUCTURE OF THE WOOD.

TIMBER
1630

possesses great elasticity, and is for this reason particularly well adapted for temporary stockades which are exposed to cannon-shot." (*Drury*.)

DOMESTIC SACRED USES

DOMESTIC
1631

Hukah
Bowls
1632
Ornamental
Objects
1633
Spoons.
1634
Sugar-pots
1635
Tea-pots
1636

a graphic account of the manner in which the cocoa-nut enters into the every-day life of the people of the tropics:—

Dickens in *Household Words* says: "To a native of Ceylon the

C. 1636

COCOS
nucifera

The Cocoa-nut Palm Domestic Appliances

DOMESTIC

cocoa nut palm calls up a wide range of ideas, it associates itself with nearly every want and convenience of his life. It might tempt him to assert that if he were placed upon the earth with nothing else whatever to minister to his necessities than the cocoa nut tree he could pass his existence in happiness and content. When the Cingalese villager has felled one of these trees after it has ceased bearing (say in its seventh year) with its trunk he builds his hut and his bullock stall, which he thatches with its leaves. His bolts and bars are slips of the bark by which he also suspends the small shelf which holds the stock of home-made utensils and vessels. He fences his little plot of chillies tobacco and fine grain with the leaf stalks. The infant is swung to sleep in a rude

1. SHUT a yoke or pangs formed of a cocoa nut stalk. When the child
he drinks of the fresh juice of the young nut, when he is hungry he eats its
soft kernel. If he has a cold he takes a small quantity of arrack distil-

cocoa nut oil, which
softens it with cocoa nut
oil - a cocoa nut

chars, the
the tree
jars his
Over his
cocoa nut
course, a

accordance with fact. It is however a true picture of the all important
of the Prince of Palms to the inhabitants of the tropical regions.

In order to convey some idea of the numerous uses of the cocoa nut
palm the following extract from the Colonial and Indian Exhibition
Catalogue may be here reproduced. It is a list of certain articles prepared
by the

(1) state
&c
y the
over

the metallic one of not being corroded

- (3) Draiser (*Zara*)—Used for draining food fried in *ghí* (clarified butter) or oil.
- (4) Ladle (*Doho*)—Used for water.
- (5) Ladle small (*Buddi*)—Used by natives for taking out oil for daily use from an earthen vessel containing the yearly or quarterly stock. It is not corroded by the oil.
- (6) Hubble bubble (*Gudgudi*)—This is the *hukah* of the poorer classes.
- (7) Beads (*Mams*)
- (8) Vinegar (*Sirka Amti*)—Made of the juice (*toddy*) of the cocoa nut palm.

The Cocoa-nut Palm: Domestic Appliances.

COCOS
nucifera.

DOMESTIC.

- (9) Pickle (*Lonche, Achár*)—Made of the pith of the top of the fresh tree with vinegar of the juice (*toddy*) of the same palm.
- (10) (*Pogi*)—The spathe of the blossom.
- (11) Rib (*Kadî Hirkûte*)—The rib of the leaf.
- (12) Broom, Goa (*Kersunf, Butará, Zadá*)—Made of leaf-ribs, it is
- (13) ..
- (14) ..
- (15) ..
- (16) ..
- the size is for a child. Set in metal may be used as a watch guard
- (17) Drum (*Dholki*).—Made of a piece of the trunk of the cocoa-nut tree
- (18) Wood piece of rafter (*Barod Wánsa*).—Made of the lower part of the tree 10, 20, and 25 feet in length.
- (19) Oil (*Khobrel*)—Oil expressed in the native mills for commerce.
- (20) Oil (*Muthel*)—Oil extracted from fresh cocoa-nuts by rasping fine, drying, and pressing between coir and twisting with hands or by extracting the milk and separating the oil by heat. Used internally in lieu of cod liver oil and externally for ulcers with good results.
- (21) Hair oil—Cocoa nut hair oil
- (22) Liquor (*Daru, Raslu Urakkh*)—Spintuous liquor 60° U.P., distilled from cocoa-nut juice (*toddy*) and drunk hot
- (23) Punch (*Quimado, Portuguese name*)—The punch is made of the liquor of the cocoa-nut palm with spices and sugar from the receipt of the Portuguese. There is no native name for it, and it is only known to the Native Christians of Bombay. Drunk hot for a cold, one or two cupfuls.
- (24) Liquor (*Fhenidarú Port Dobrado*) (*double*)—Liquor made of cocoa-nut (*toddy*) juice by redistillation 20° U.P.; formerly much used
- (25) ..
- (26) ..
- (27) ..
- (28) .. m used
- (29) .. of Goa, &c.
- (30) .. sizes by natives
- (31) .. es and sizes by
- (32) Floor mats.—Made in Malabar and in the Bombay jails of different sorts and colours.
- (33) Cage (*Pinjard, Khuri*)—Made of the rib of the leaf.
- (34) Horn (*Pspaní Tontora*)—Made of the leaf of the palm; gives a loud sound when fresh.
- (35) Horn, small size (*Dhikkî Pspaní*).—Made of the leaf of the palm; gives a loud sound when fresh.
- (36) Toy parrot (*Pipaf*)—Made by children of the leaf of the palm; when new it looks better.

COCOS
nucifera

The Cocoa-nut Palm • Domestic Appliances.

DOMESTIC

- (37) Toy parrot in cage (*Pinjaryāt Popat*) — Made by children from the leaf
- (38) Leaf
- (39) Root
- (40) Rope (*Kathā, Sumbha*) — This is extensively used
- (41) Oil-bottle (*Doula*). — Hung beneath the labour-cart with castor oil and brush in it for lubricating axles
- (42) Nut, immature (*Ahakota*) — Used medicinally as an astringent, children are fond of it
- (43) Trough (*Panshira*) — Trough made of cocoa-nut tree, used for catching water drawn from a well with a Persian wheel for irrigation purposes (model)
- (44) Conduit (*Panhāl*) — A conduit put under the hole of the trough for conveying water for irrigation purposes
- (45) Adapter (*Nala*) — Piece of the adapter used for connecting the native still to the condenser
- (46) (*Tuntuna*) — Native musical instrument, used by the poorer classes
- (47) Beam (*Bahal*) — Piece of beam of the shape used for houses. It is also used for fishing-stakes in the sea, generally two cocoa nut trees make a stake 60 to 70 feet long.
- (48) Rosary box — Made of immature cocoa nuts
- (49) Charcoal Powder (*Kolsā*) — Burnt shell used for preparing black and lead coloured washes for houses
- (50) Broom (*Zadu*) — Made of the ribs of the leaf, used by the Bombay and other municipalities for sweeping roads, streets, yards, &c
- (51) Broom (*Zaddū*) — Made of the stems of the blossom and nuts, used by the cultivators for collecting dry leaves for (*rab*) burning on the fields
- (52) Cask
- (53)
- (54)
- (55) the gosavies (a class of professional beggars)
- (56) Sling (*Shinka*) — Used for keeping sundry articles of food out of the
- (57) F
- (58) Tar with acetic acid (*Kartel*) — Made by burning the shells in a
- (59)
- (60) washing baskets and rice drainers (*Shibum*)
- (61) Sugar, molasses (*Gāl*) — Made of the juice (*toddy*) in Goa
- (62) (*Band*) — Peeled from the outer part of the stem of the leaf. Is used as a cord by the *toddy* drawers
- (63) Cocoa nut gilded (*Karyacha Narel*) — Offered by the higher classes of Hindus to appease the sea on the cocoa-nut fair day. At weddings the bridegroom and bride carry it in their hands

The Cocoa-nut Palm : Domestic Appliances.

CODONOPSIS
ovata.

DOMESTIC

- (64) Husk (*Sāl, Chavād, Sodan*) —Used as fuel. Especially for backing purposes also affords coir fibre
- (65) Scoops.—Made of the shell The round and deep ones are used as drinking cups
- (66) Neck belts (*Pattā*).—Used for yoking bullocks and buffaloes to carts, ploughs, oil-mills, &c
- (67) Sack (*Thosli Galī*) —Used for sending out articles; a somewhat similar one is attached to the cart for carrying straw or grass
- (68) Tooth-brushes (*Daton*) —The pedicels of the blossom are used as tooth-brushes
- (69) " " " " " " " " " " " "
- (70) " " " " " " " " " " " "
- (71) " " " " " " " " " " " "
- (72) Soap (*Sabū*) —Made of cocoa-nut oil, has larger percentage of water than any other soap
- (73) Puzzles and toys.—Rings, whips, neckties, rattles, crosses, &c.
- (74) Bats for cricket —Made of the wood (cocoa-nut)
- (75) Oil-cakes (*Pend*) —Oil cake from the native mill
- (76) Patimar (ship) (*Fatemirī*) —Toy made by the boys of the fishermen class
- (77) Boat, fishing (*Holke*) —Toy made by the boys of the fishermen class.
- (78) Kernel (*K'hobre*) —Dry kernel
- (79) Stem (*Fishtar*) —Used as broom
- (80) Charpai, Cot (*Khat, Bāj*) —Used by the natives (model).
- (81) Potaah (crude) (*K'har*) —The ash of the stem of the leaves, they produce 20 per cent of ash
- (82) Cocoa-nut, abortive (*Vānsā Nārel, Vāhul*) —Used as floats for begin-
- (83) " " " " " " " " " " " "

Codilla —A commercial term for the refuse separated on cleaning hemp or flax fibres.

1637

CODONOPSIS, Wall, Gen. Pl., II, 557

[t 60, fig. 3; CAMPANULACEÆ.

Codonopsis ovata, Benth; Fl. Br. Ind., III., 433; Royle, III., 253,

1638

Vern —Lūdāt

Habitat.—A herbaceous plant common in the N W Himālaya from Kashmir to Gurhwal at altitudes from 8,000 to 12,000 feet, distributed

MEDICINE
1639FOOD.
1640

or cooked.

C. 1640

COFFEA
arabica

Coffee.

COFFEA, Linn.; Gen. Pl., II., 114.

[RUBIACEÆ.

1641

Coffea arabica, Linn.; Fl. Br. Ind., III., 153; Wight, Ic., t. 53;

COFFEE, Eng.; CAFÉ, Fr.; KAFFEE, Germ.

Vern.—*Bun* (the berry), *Kahwa* (the same roasted and ground). *Kawa*,
bun, *bun*, *coffee*, *coffi*, HIND
Kawa, *bun*, *kahwa*, *band*, *c*
 MAR; *Bünd*, *tochem-keweh*,
cap, TAM; *Kapi-vuttulu*, *ca*
Kapi, *Bonda-bwa*, *kapi-on*,
 ARAB; *Bun*, *qahwa*, *kahwa*,
kapi-si, BURM; *Kopi*, *atta*,

Shua, and in Yemen as applied to the berry.

Referred to in the following works: Fl. Br. Ind. III. 153.

ings of the
 soc. Jour.
 dia, 1864,
 11er, 1869;
 dia Office
 "spandence
 75; Corre-
 ssociation
 1879; D
 Reports of
 Food, 40;
 Welter-
 'ackwood's
 lassal, on
 'ietner, on
 re Coffee-
 n Mysore
 on, 1871);
 806), W.
 ? W Las-
 n Loerne,
 'ler, Pros-
 Laborie's

Coffee Cultivation

COFFEA
arabicaCULTIVA-
TION.

Habitat—Most authors seem to agree that the coffee plant is indigenous to Abyssinia, the Soudan, and the coasts of Guinea and Mozambique. "Perhaps in these latter localities, so far removed from the ... No one has yet found it of penetrating into it will be hard to ability of germinating, often spring up round the plantations and naturalise the species. This has occurred in Brazil and the West India Islands, where it is certain the coffee plant was never indigenous" (*De Candolle*).

It is a small, much-branched tree or bush 15 to 20 feet in height, with whitish bark and white orange like flowers. The fruit, which is red on ripening, is about the size of a small cherry, and contains two seeds, closely united. These on being separated constitute the coffee berries of commerce, and on being roasted and ground, the coffee of the shops.

1 In India *Coffea arabica*—the coffee plant—is largely cultivated, but other species are also met with.

2 *C. bengalensis* Roxb., occurs from Kumaon to Mishm, also in Bengal, Assam Sylhet, Chittagong and Tenasserim. Fruit ovoid-oblong (*Harina* in Chittagong see *Agri. Hort. Soc. Ind. Proceedings*, Oct. 1865).

3 *C. fragrans*, Korth., found in Sylhet and Tenasserim. Fruit much like the two last.

4. *C. Jenkinsii*, Hook f. Khasi Mountains. Fruit and seeds different from the last being ellipsoid.

5 *C. khasiana*, Hook f., Khasi and Jaintia hills. Fruit $\frac{1}{2}$ inch in diameter, smooth, seeds ventrally concave.

6 *C. travancorensis*, W & A., occurs in Travancore. Fruit broader than long.

7 *C. Wightiana*, W & A., the Western Peninsula, in arid places from Coorg to Travancore. Fruit much broader than long, with a deep furrow.

With the exception of the first these species are not of any special economic importance, and very little coffee is grown in the tracts in

HISTORY OF COFFEE CULTIVATION AND OF THE HABIT
OF COFFEE-DRINKINGCOFFEE CUL-
TIVATION.
1642

The regions best suited for coffee cultivation lie between 15° N. and 15° S. latitudes, but it is grown as far as the 36° N. to the 30° S. in regions where the temperature does not fall beneath 55° F. (13° C). The area of its cultivation is in fact very nearly the same as that of cotton. Within the tropical region it may be cultivated at the level of the sea or even much further to the north and south of the equator than has been indicated. The plant manifests, in other words, a remarkable power of endurance, but it does not follow that where it may be grown as an ornamental garden bush it may there afford the commercial product. Within the tropics it will yield profitable returns only

COFFEA
arabica.

Habit of Coffee-drinking

HISTORY

winds blow away the flowers and make 50 per cent difference in crop. If too hot and dry, the plants require shade, and if strong winds prevail during the flowering season, belts of forest have to be left to protect the plantation. This is regarded an important consideration in clearing land for a coffee plantation. Dr Shortt says "In low countries there is not sufficient moisture in the soil and when shaded and irrigated, it produces a coarse and uneven bean devoid of the peculiar aroma essential to good coffee."

the effects of marine influence. On this account the recommendations of the early advisers of the Government of India to prosecute experimental coffee cultivation on the lower Himalaya from Darjiling to Kumson have been abandoned. The occurrence of certain wild species on the

seeds

It has been stated that the coffee plant of commerce is truly wild in Abyssinia and that it is there called bun or doun. This name

coffee was introduced into Aden by a certain Sheikh Shihabuddin

there arose after some few years, in 1511, a crusade against its use as un-

ed a Greek servant, Pasqua Rossie, for the purpose of preparing the favoured beverage. His friends grew so fond of it that to prevent their

Consumption of Coffee

COFFEA
arabica.

HISTORY.

too frequent visits to his house he recommended Rossie to start a public coffee-shop. This was opened in St Michael's Alley, Cornhill. Coffee-shops rapidly multiplied, but the beverage (although from a very different reason) soon met with as much official opposition in London as it had sustained in Constantinople. Charles II (in 1675) viewed these shops as the meeting-places for disaffected persons, and a royal proclamation was issued for their suppression. Coffee is spoken of as being in use in France in 1630, and the first public café was opened in Paris in 1669. Shortly after, it became general throughout Europe. It may be here added that of the three great dietary beverages Cocoa was the

trade which by 1847 checked the further development of the demand for coffee. There are doubtless many causes that may have contributed to bring this about, chief amongst them may be placed the facility with which coffee can be adulterated, the greater consumption of cocoa, and the ease

relative measures appear to have had much to say to the growth of a greater coffee consumption in continental countries than in England, or rather to the decline of coffee consumption manifested in Great Britain with the

—The consumption of coffee
in 1857, 34,518,555lb, in 1867,
to 31,859,408lb, and slightly

BRITAIN.
Decline in
Consumption.
1863

improved in 1880, being in that year 32,180,000lb. These figures must not be confused with the imports of coffee. Great Britain does an immense

average of 110, and European Russia 4lb. The United States of America are supposed to use on an average 8lb per head of population per annum. Mr. H. Pasteur, in his report on the coffee shown at the

COFFEA
arabica.

Coffee Cultivation Extended

HISTORY

Color standard as follows:—
 tion of
 tons
 and J
 being
 tons, Ceylon 10,000 to 12,000 tons, and Jamaica 4,000 to 5,000 tons
 s and of
 is finer
 s that of
 Mocha,

which at the time stood above all others

EXTENDED
CULTIVA-
TION
1644

EXTENDED CULTIVATION.—The cultivation of the coffee plant began to extend towards the end of the seventeenth century, being carried on in

produces more coffee than all the other plants in the world. In Brazil coffee is completely acclimatised, and there are said to be 530 million plants under careful cultivation. Coffee is also extensively grown in Costa Rica, Guatemala, Venezuela, Guiana, Peru, and Bolivia with Jamaica, Cuba, Porto Rico and the West Indian Islands generally. Its

and India are the countries where its introduction has assumed an important commercial character

CEYLON
Introduction.
1645

tinued by the natives of Ceylon. In 1825 the impetus to fresh effort was given by Sir Edward Barnes in the establishment of an upland European plantation. In 1877 it was estimated that the capital invested in Ceylon coffee was nearly £1,000,000. It is now a fungus

Introduction of Coffee Cultivation into India.

COFFEA
arabica.cwt. in 1876, to 312,000 cwt. in 1884, and to 230,000 cwt. in 1885"
(Pasteur)HISTORY.
INDIAN.
Introduction.
1646

INTRODUCTION INTO INDIA.—The history of the introduction of coffee

COFFEA
arabica

Coffee Cultivation—Locality

HISTORY.

thousands of acres of good suitable land for coffee near navigable rivers where manure and labour are cheap.

Coffee has also been introduced into Burma. For some time the effort to open out plantations seemed to be doubtful, and Mr Pettley, speaking of the garden on the Karen Hills, north-east of Toungoo, reported recently that much damage had been done by a mole cricket. Since then, however, the report is that the coffee is doing well, and that the coffee is now being sent to Upper Burma.

that the Arabian variety does best on the Toungoo Hills, while at Tavoy the Liberian variety is alone thought worthy of cultivation. "Local demands, too, are increasing, as land is being taken up along the lines of railway between Rangoon, Prome, and Toungoo, and gardens have been formed whereon small grantees are now cultivating fruit and other useful trees as well as coffee."

METHODS.
1647

METHODS OF CULTIVATION

Space cannot be afforded to deal with every feature of this subject; the reader is referred to the numerous special publications quoted under the paragraphical references, only the more salient features will be touched upon, and especially those which have a bearing on the future expansion of the industry.

LOCALITIES, CLIMATES, AND SOILS SUITABLE FOR COFFEE CULTIVATION AS AN AGRICULTURAL PRODUCT—Under the heading "History of Coffee," the subject of the region of coffee cultivation and the climate necessary have been discussed. Dr Shortt says of soil, "This should be rich, abounding in moisture and containing much humus or vegetable mould, consequently we find that the plant thrives best on either red or black earth, containing combinations or preparations of iron, and covered over with humus formed by the decay of vegetable matter produced by dense forests. When these points are overlooked, the results are soon seen in the young plantation. The planter, perhaps, instead of choosing forest land, has taken up a poor grassy or sandy expanse and however much water he may have access to, his plants are stunted and soon become yellow, unless he resorts to heavy manuring at a very early stage, which materially increases the expense of the concern. In hard rocky soils the plants require to be deeply excavated to permit of the tap roots of the plant striking perpendicularly down, and even when every precaution is taken, it will be found that estates opened out on poor soils will always prove more expensive than those on forest land, and are not so lasting. The berry produced on rich ferruginous clay is found to contain more aroma and the bean is heavier when compared with those of other localities. This fact is so well known to coffee-brokers generally that, in London, a new importation is frequently weighed after being roasted." Some difference of opinion prevails as to the degree of moisture the soil should contain. In *Spruce's Encyclopedia* there occurs the following: "The points which determine the value of a plot for coffee culture are—1, elevation, 2, aspect, 3, shelter from winds, 4, shelter from wash, 5, temperature, 6, rainfall, 7, proximity to a river, 8, character and richness of soil. Most of these are necessarily subject to variation according to locality. Shelter from wind is perhaps of paramount importance and should not be sacrificed for richer soil, as the latter can be artificially obtained much easier than the former. In wooded country the estate may be laid out in blocks of 50 acres, enclosed by

Coffee Cultivation—Seed

COFFEA
arabica.

METHODS.

deadly effects of a damp atmosphere, for, in all probability, he will have to spend his time surrounded by the direst malaria, &c. Spons', on the other hand, says — "The most suitable climate is precisely that which

to cult.

Nursery and Seed.—Having selected the site for a plantation, cleared and burned the trees (taking care, where necessary, to have protecting belts against prevalent winds), laid out the roads and carried the water-supply to the coffee-house, it next becomes necessary to select and pre-

Nursery.
1648

water

Seeds.
1649

the morning or after sunset.

The selection of seed is of great importance. The stock should be

12 inches apart from each other, so as to give the plantings plenty of room to grow, and subsequently enable the planter to remove them with facility from the nursery to the plantation, or the seeds may be sown in drills

COFFEA
arabica.

Coffee Cultivation—Planting.

METHODS.

and as the seedlings begin to grow the drills should be thinned out to the

planted, in damp, cloudy weather, from the seed-beds to the nurseries, and placed 9 to 12 inches apart. Care must be taken not to double up the tap-root, and not to leave a 5-
roots. If the tap-root is very 1
when it soon shoots again
nurseries is not practised, the
have grown larger, but Stainbank and others strongly recommend the former plan, as, by checking the growth, the young wood becomes hardened, and better able, when finally planted out, to resist insects and unfavourable weather. A practical suggestion for preventing young seedlings being eaten off at the surface of the ground by grubs, is to lightly wrap round a piece of paper about 3 inches broad, where the stem joins the root, on planting." (Spons)

Planting out
1650

LIVING AND PLANTING OUT—Soon after being cleared the estate is "lined out" ft
are in vogue (
up and down
this line, stake
upon for the position of the plants. to each stake a rope is fixed, and stretched parallel with the base line and as straight as possible. small stakes are provided along these lines. a rope is finally held across them at succeeding stages of equal width, as guided by measuring poles, and the small stakes are put in where the moveable rope crosses the fixed ones, each stake indicating the site for a plant. (2) A rope is furnished with bits of scarlet rag at the distance fixed upon between the plants, it is stretched across the plot and stakes are inserted at each rag, the rope is
ring rods. The
t is more labor-
etch of the rope

in their perma-
lected for trans-
plantation, many coffee planters prefer to have two-year old seedlings
part, and the ques-
gree of shade, and
s are not likely to
reverse being the
th. In India the
distance adopted varies between 4 and 8 feet each way—7 feet being
very common, or 6 feet between the plants and 7 feet between the rows
points
th each
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'anting,
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Cultural
operations
1651

C. 1651

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-ition so

Coffee Cultivation—Shade.

COFFEA
arabica.

METHODS.

as to prevent the young seedlings from being choked. Staking, or sup-

porting, may not be enough, and the degree to which the nature of the soil has deprived the

plantation of the natural protection which belts of trees would have afforded. According to many planters, however, all trees should be removed and shade procured through the cultivation of the charcoal tree (*Spondia Wightii*). In two years this forms an ample shade, but as it

is not so hardy as the trees which are to be renewed. This is

regretted, in his report

it is a matter for

regret," he

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forwards of

is more important than a complete system of drains and roads. At the

operations in this direction have not been completed up to date, the ener-

gies of the planter during the first two years may very appropriately be

turned to these considerations. Drift surface-water not only removes

the soil, but may altogether wash away the plants. A proper system of

drainage becomes essential, not only to remove the water from damp and

cold water-logged soils, but to provide against the dangers of sudden

changes of level, and the danger of the soil being washed away by the

drains. The drainage should be such as to remove the water from the

surface of the soil, and not from the roots of the plants. The drainage

should be such as to remove the water from the surface of the soil, and

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the plants. The drainage should be such as to remove the water from the

surface of the soil, and not from the roots of the plants. The drainage

Pruning,
1652

COFFEA
arabica.

Coffee Cultivation—Pruning.

METHODS

postpone the operation till the shrubs have borne their maiden crop, even though extra staking be required to withstand the wind. His plan is to remove the two primaries at the required height, by a sloping outward cut close to the stem, and then to remove the top by an oblique cut, so that the stumps resemble a cross, and a firm natural knot remains to guard against the stem splitting down. Hall (Ceylon) contends that the plants should be topped as soon as they have reached the required height, when the soft wood is easily severed by a pinch between the finger and

topped either at their full height—
ucker to grow up on the weather
atter plan is preferred. There is
the height to 5 feet, not only is
without damage to the tree, but
s are more readily made to cover

Dr. Shortt says "Pruning consists of various operations connected with either arresting the height of the plants to cause them to spread out laterally, or in removing the additional growth of wood, to encourage the plants to push out new

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first result of topping is to induce the growth of masses of shoots, these are removed by what is technically called *handling*. "The first to appear are vertical suckers or 'gormandisers' from under the primary boughs; these are immediately rubbed off without injuring the bark. From the primaries spring secondary branches, in pairs, and at very short intervals. All such appearing within six inches of the main stem are removed at once, so that a passage of at least a foot is left in the centre of the tree for the admission of air and sun. The object of pruning is to divert the energies of the plant from forming wood and to concentrate them upon forming fruit. The fruit of the coffee tree is borne by young wood, and as the secondaries are reproduced when removed, they are cut off as soon as they have borne, and a constant succession of young wood is thus secured" (Spons). This removal of secondary twigs from the primary boughs is what the planters call "pruning". The practical effect of the treatment briefly indicated above is to cause a plant about 5 feet in height to develop horizontally primary branches or boughs at intervals of about 6 inches throughout the height of the stem, and to form along these boughs a constant supply of secondary fruit-bearing twigs. All ascending or cross-wise branches or twigs are at once removed, so as to force the plant into the arbitrary and unnatural type of horizontal spreading branches which have the advantage of exposing to the sun and light a large surface from which the crop can with ease be removed. When practicable, the bushes should be handled twice before the crop, and all

of the crop. The prun-
s begin to form, but
hat a flush of so heavy
is necessary to sacrifice

Coffee Cultivation—Season

COFFEA
arabica.

METHODS.

this by pruning the plant down to the extent it may be expected to fruit without injury. The lateral or primary boughs should not be allowed to grow more than 2½ feet, otherwise they will droop and exclude the light from those below. In pruning, it is often recommended to leave the plant with some of its fruiting next year so that a continuous crop is not nipped off, broken, dis-

CATCH CROPS—Much has been written for and against the growing of other crops along with coffee. In Darjeeling it was tried to grow tea and coffee together, but with little or no success, in spite of the fact that the out door labour and manufacture of these crops so fit into each other that economy might be effected. In Natal and other countries, plantains,

Catch-crops
1653

SEASONS FOR COFFEE PLANTING AND MANUFACTURING OPERATIONS—The industry being chiefly in South India, the seasons for operations very closely correspond with those of Ceylon. The season for

Seasons.
1654

..

for the collection of the crop and the manufacture of the berries. The fruits commence to ripen in October or early in November and continue till January. Thus from flowering to harvest occupies about eight months. None but fully ripe berries (technically known as 'cherries') should, according to Dr Shortt be collected, the women and children going over the plantation periodically to remove all the bright or blood red ones, while carefully leaving the others to mature, once ripe, the sooner collected the better. Mr Pasteur says "The usual course, however, is to pick the cherry before complete maturity, when it is of a deep red or cherry colour, the berry inside being then found to be of a fine dark green or bluish green, which it is the endeavour of the planter to preserve as carefully as possible the value of his coffee depending chiefly on the depth and brightness of the colour." The more gradually the bloom fades the better

berries to be picked up, also the berries that have fallen to the ground. This forms what is generally known as "jackal coffee." Before the boughs are opened out again, the ground around each plant is manured and forked.

The preparing or manufacturing of the "cherry" into the "berry" will be found dealt with in a further page.

INDIAN AREA UNDER, AND OUTTURN OF, COFFEE

The cultivation of coffee is practically confined to Southern India. During the three years 1883, 1884, and 1885 the average area under mature

INDIAN,
Area and out-
turn
1655

C. 1655

COFFEA
arabica.AREA AND
OUTTURN.

Area of Coffee Cultivation in India.

plants was returned at 186 500 acres, and the average yield at 31½ million pounds, which were thus distributed —

	Acres	lb
Mysore	82,100	7,110 000
Madras	55,100	13,160 000
Coorg	42,300	9,330 000
Travancore	4 800	820 000
Cochin	2 200	830 000
TOTAL	186,500	31,250,000

These statistics, which are in all probability defective, have been taken from the Statistical Tables of British India published by the Department of Finance and Commerce up to 1887. These tables include the Native States of Cochin, Travancore, and Mysore, and hence the area given is greater than that returned by the British India Company.

India
total
acre

(
British India of the Nilghiris it has been said that there exists 200,000 acres of reserve suitable for coffee. The port of shipment for Nilghiri coffee is Calcutta.

not likely to extend, as the area has been
its, 81,543

Mysore
too great
for coffee-planting progressing much further than at present, except on the sheltered tracts

"A northern aspect is best, being moist during the dry season, and possessing the most uniform temperature eastwards or westwards according to the prevailing winds. On the western side

may be found useful —

In Mysore the cultivation is limited almost exclusively to the Kadur District. In Malabar, the cultivation is limited to the Malabar Coast.

MYSORE
1656

Area of Coffee Cultivation in India.

COFFEE
arabica.AREA AND
OUTTURN.

planters was Mr. Cannon, who formed an estate on the high range immediately to the south of the Baba Budangiri, where the original coffee-plants are still in existence flourishing under the shade of the primeval forest

"The success of Mr. Cannon's experiment led to the occupation of ground near Aigur in South Manjarabad by Mr. Green in 1843. During the last fifteen years, estates have sprung up between these points with such rapidity that European planters are settled in almost a continuous chain of estates from the northern slopes of the Baba Budans to the southern limits of Manjarabad, not to mention Coorg and Wynaad beyond."

The above account of the introduction of coffee into Mysore was first published by Colonel Onslow, from whom all subsequent writers have borrowed their information without materially adding to or correcting any one feature of the original statement.

Madras Presidency—The following extract taken from pages 290 and 291, Vol I of the Madras Manual published in 1885, gives interesting particulars regarding the cultivation of coffee in the Madras Presidency: "The principal coffee tract of Southern India is along the western coast, and coffee estates extend in nearly an unbroken line along the summits and slopes of the Western Ghats, from the northern limits of Mysore down to Cape Comorin. The only portions of the area within the limits of the Madras Government are the Wynaad tract and the Nilgiri Hills, the rest being in Mysore, Coorg, and Travancore."

Of the early plantations the Madras Manual adds, "Nearly all the land taken up at this period was what is known as grass or bamboo land, and in consequence most of the estates proved unprofitable. Of many of them not a trace, except the ruins of bungalows remains at the present day. After the first attempt at coffee cultivation in the Wynaad district, the only other attempt was made in the Coorg district in 1858, and, according to the returns then made, the acreage was 29,909 08, of which 21,479 54 acres were held by Europeans and 8,429 54 acres were held by natives."

MADRAS.
1657South
Wynaad
1658.

1868, and, according to the returns then made, the acreage was 29,909 08, of which 21,479 54 acres were held by Europeans and 8,429 54 acres were held by natives."

	Cwt
1856-57	3,658
1857-58	16,204
1858-59	36,934
1859-60	42,630
1860-61	48,742
1861-62	91,080
1862-63	43,907
1863-64	91,947
1864-65	110,548
1865-66	125,391
1866-67	66,552
1867-68	123,011

C. 1658

Area of Coffee Cultivation in India.

AREA AND
OUTTURN
Nilghiris
1650

"Coffee cultivation on the Nilghiris was reported on in 1872. A large area of land on the Nilghiris has proved to be admirably suited for the cultivation of the coffee shrub. Not less than 22,897 acres are now under coffee plantations besides 12,231 acres taken up for planting. Twenty-five years ago the area under coffee did not much exceed 500 acres. This great increase is entirely the result of private enterprise, and has added much to the prosperity of the Nilghiris, while at the same time benefiting the districts immediately adjoining. In the establishment of these coffee estates a property has been created worth about 5 millions of rupees. Of the total expenditure, about one third is for the payment of

" -- " ... of laboring people
king, &c, a
previous to
only on the

eastern slopes, but they have now been extended to the southern, northern, and north-western slopes, there are also some extensive plantations in the Ouchterlony Valley and in the neighbourhood of Coonoor. Coffee cultivation is also carried on on the Shevaroy Hills in the Salem District, where nearly 6,000 acres are under the crop, and an area of 4,680 acres has been taken up for planting, on the Pulney and Shiroomullay Hills in Madura, where nearly 4,400 acres have been planted and a considerable area has been taken up for planting, and in the Tinnevely and Coimbatore Districts, in the former of which there are about 2,000 acres under coffee and in the latter about 800 acres."

Coorg.
1660

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56,440

plots of

size of
Of the

on an

whole area 40,350 are bearing, producing 6,125 tons of coffee, or on an average . . .
which is . . .
acre . . .
estates.

cultivation at the rate per acre assumed above comes to nearly 32 lakhs of rupees. Of this not less than 60 per cent on an average may be estimated as having been paid to labourers in wages. Calculating that 26,893 labourers, which is about the average number employed throughout the year, received Rs 6 each per mensem, upwards of 19 lakhs of rupees were expended for labour during the year. The value of the coffee produced, taking the selling price to be, on the average Rs 30 per cwt on the spot, was about 36 lakhs of rupees." (*Madras Weekly Mail*). 1888

Travancore
1661

Travincore—The area under coffee in the former State in 1885 was 4,013 acres, and in the latter 2,177 acres. The area under coffee in Travincore seems to have declined considerably within the past few

C. 1661

Coffee Manufacture

COFFEA
arabica.AREA AND
OUTTURN.

the group known as the Anamalais. The plateaux, by reason of their good climate, rich soil, abundant timber and water-supply, are likely to become better known as the demand for coffee land increases. One plateau alone (Eroovimullay, or Hamilton's Valley) is 6 miles long by 3 wide, and contains about 10,000 acres of excellent tea and coffee land.

In Cochin there were, in 1883, 17 gardens, and these gave the return of 312lb to the acre at a cost of Rs 4.

COCHIN
1662
Technical
Terms.
1663

TECHNICAL TERMS USED BY THE COFFEE PLANTERS.—The ripe coffee

chinery necessary for this purpose

PREPARATION OR MANUFACTURE

MANUFACTURE.

The preparation of the "berry" from the "cherry" may be said to be accomplished in the following stages: (1) *Pulping*, (2) *Fermenting*, (3) *Drying*, (4) *Peeling, Milling, or Hulling*, and (5) *Sizing and Winnowing*.

A volume might be written on the various systems and mechanical

being tedious, ineffective, and expensive this process does not secure the

Pulping.
1664

ively accomplished if the collections of ripe cherries made each day are passed through the machinery at once. If unavoidably delayed it may be necessary to ferment the cherries before they can be pulped. The most simple machine in use is that known as the "disc pulper." This consists of rotating discs the surfaces of which are covered with sheet copper roughened by having projections punched forward. A "single pulper" of this description will pulp 20 to 25 bushels an hour and may be worked by three coolies. A "double pulper" of this type has two such discs and is furnished with a feeding roller. It will pulp 40 bushels an hour, and may be worked by from four to six coolies, and double that amount if worked by

C. 1664

COFFEA
arabica.

Coffee Manufacture.

MANUFACTURE.

steam The discs work against smooth iron beds so adjusted that the complete cherry cannot pass between. They are torn upwards against the beds, and the projections on the discs tear off the pulp, allowing the beans to drop into one receiver and the fragmentary pulp to be carried into another. The disc pulper is in fact somewhat like the cotton gin which drags the fibre forward and drops the seed behind. The 'cylinder pulper' is an older invention in its conception, but has been improved and perfected to a much greater extent than the disc, the latter, being

cherries are spread out—the pulper

By constructing this building again

cherries may be carried direct into

raised. A good supply of water has also to be conveyed to the loft so as to descend with the cherries into the pulping machine in a continuous stream.

Space cannot be afforded for a discussion of all the inventions and contri-

... the bean. The
s are carried
re separated
to pass once
is carried

from the loft of a tube which dips to the bottom of a basin known as the *hopper*. Stones subside in the hopper, while the continuous stream from above causes the hopper to discharge a uniform supply of cherries and water to feed the pulper.

FERMENTING—The parchment coffee, which may or may not have been assorted by contrivances in the pulper and sieves, has now to be fer-

If this be not accom-
ing advantage of the de-
tanks, and these tanks
platforms on to which
sed. There are gener-

ally four fermenting tanks—two in which the fermentation actually takes place, and two in which the beans are washed. One of each is used for the produce of one day's pulping. All the coffee pulped in one day is allowed to remain in the front or receiving cistern until fermentation has set in. The period necessary for this will depend greatly on the temperature of the atmosphere, but from 12 to 18 hours will generally

into the washing
s pro-
may be
as to

Fermenting
1665

Coffee Manufacture.

COFFEA
arabica.

MANUFACTURE.

Drying
1660

and are accordingly preferred. The tanks should slope towards the dis-

event of an occasional shower, but shed accommodation into which the beans may be rapidly conveyed is essential. During the drying, the beans have to be turned over repeatedly either by rakes or by the coolies'

many cases, however, there are neither appliances, time nor labour, to put the fresh-gathered fruit in the sun the cherry dries quickly, detriment of the colour as well difference between unwashed or plantation coffee,—the taste of the washed coffee being, as a rule, much more delicate, and free from the earthiness and common rough flavour of the unwashed

PEELING or MILLING —This consists of the removal of the parchment and silver from the beans. As already stated, this operation is now chiefly effected by the dealers, at the port of shipment, and not by the planters. Indeed, much has been written in favour of the beans being sent to use in London for
 eur's report will be indicating a pos-

Peeling.
1667

"Among the samples of Wynaad coffee, those from the Eva Estate deserve special attention, one half of that crop having been despatched in parchment to be peeled and sized in London. The experiment has proved

COFFEA
arabica

Coffee Manufacture.

MANUFACTURE.

coating almost immediately after being picked. The curing requires machinery, motive power, drying grounds, delicate manipulation, and constant supervision, where any of those requisites fail, the coffee suffers in appearance, and consequently in value. Suitable machinery for treating parchment has been erected at two of the London wharves, and there is every reason to hope that this is only the beginning of a new and profitable home industry. Growers will not be slow to perceive that the small increase of freight which they have to pay on parchment is more than compensated for by the enhanced price which the improvement in the quality of their coffee will enable them to obtain. In the *Kew Bul*

passed through the mill the beans require to be again heated. On the plantation this is generally done by exposure to the sun. The extent to which this is necessary depends greatly on the nature of the beans, and long experience is required to determine this point. As a practical hint it is generally laid down that they should be dried till they resist the pressure of the thumb nail, but no two samples are alike, and overdrying will

Sizing
1668

universally employed

Packing
1669

PACKING -- Having followed all the precautions and adopted all the most approved methods and appliances, the coffee producer, to secure the success of his labours, has now only to attend to packing. The beans must be saved from exposure to the air, or from being packed in cases that would impart a false aroma. This is usually done by packing the

ADULTERANTS
1670

ADULTERANTS AND SUBSTITUTES FOR COFFEE

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dietary article that is so much and so persistently adulterated as coffee. This in a large measure appears to be due to the legislative system which has permitted a mixture to be sold so long as it is declared to be such. Criminality consists alone in selling as *pure coffee* an article that contains anything but coffee. Legally "chicory" may be the roasted chicory root itself or the root of an allied plant or other vegetable substance applicable for the same purpose as chicory. No questions are therefore raised as to the ingredients of a mixture, and indeed, if further protection to the manufacturer be necessary, such mixtures may even be registered as patent medicines. This fact, together with the long-established custom of mixing chicory with coffee, has given origin

Adulteration of Coffee

COFFEA
arabica.

to a gigantic system of adulteration. The substances which are most generally employed are—

"1st—Roots such as chicory, dandelion, mangold-wurzel, turnips, parsnips and carrots, &c

"2nd—Seeds such as beans, peas, date-stones, malt, rye, &c

"3rd—Burnt sugar, biscuits, locust-beans, figs, &c" (*Bell, Chemistry of Foods*)

1 Association formed in examining certain well-actices of adulteration s attention was the use on of the real article that

the mixture of the spurious with the true coffee beans might be fearlessly ground in the purchasers' presence and sold as *pure coffee*. This subject has already been alluded to under *Chicory* (see *Cichorium Intybus*, C Nos 1107 & 1108), and need not be elaborately dealt with in this place

ADULTER-
ANTS.

le without being viewed or a sugar-yielding root becomes a serious adul- used of all adulterants

Caramel

facturing special preparations or mixtures. Roasted flour coloured with ferruginous earth is to some extent used as a coffee adulterant, and even roasted liver and other objectionable animal substances are said to have been found in coffee mixtures. A simple mode of detecting the presence of chicory or other caramel admixtures in ground coffee is to throw a little on the surface of a glass of clear water. The readily solvent nature of the

The seeds of several species of *Cassia* have for centuries and are even now used by the inhabitants of tropical countries in place of coffee. These do, as a matter of fact, afford, when roasted and ground, a decoction which closely resembles coffee. The reader is referred to the account given under *Cassia occidentalis* (C No 784) for particulars of a coffee substitute which would seem to deserve more careful consideration. India could produce, at a nominal price as compared to coffee, immense quantities of the so-called "Negro Coffee," if that article should be found to commend itself as a wholesome and cheap substitute for true coffee

Negro
Coffee.

COFFEA
arabica.

Trade in Coffee.

ADULTER-
ANTS.

The work article. others in injurious reputation, and to place in the hands of the consumer a cheap and pure coffee.

COMMERCIAL
TERMS.
1671

age, and uniformity within the sample. Form to some extent, though not always, depends upon the source: there are three commercial types as to form—*Mocha*, small round peaberry; *Bourbon*, pointed and medium-sized; and *Martinique*, large and flattened. Colour depends entirely on the degree of roasting which is given to the coffee before the preparation,

PRICES.
1672

PRICES OF INDIAN COFFEE.

valued as high even as those of Ceylon; and, as stated in another paragraph, Mr. Pasteur, one of the highest commercial authorities, gives the

of native coffee was sold for the same price as a bushel of rice, viz. Rs. 44 and, about the same time, estate coffee from the Wynaad was selling on the coast for Rs. 44 and Rs. 44 (1849), estate the work- e is insign-

TRADE.
1673

TRADE IN INDIAN COFFEE

"India now stands first and foremost among British possessions, both for the quality and quantity of its production." Disease has, however, "in many places affected the vitality and shaken the strength of the trees, so that they have been less able to resist periods of drought or of heavy monsoon weather, and small and irregular crops have been the consequence. It would seem, however, as if plantations were gradually recovering their former strength, and with good cultivation and manuring

Indian Trade in Coffee.

COFFEA
arabica.

TRADE

and fair seasons India may hope to maintain its position as our largest and best field for the production of fine coffee. A hopeful sign for the future may be gathered from the fact that the average annual yield of the

from 47,000 to 38,000. This has been accounted for by the fires which destroyed certain gardens, the imperfect returns, and the amalgamation of small gardens. The bulk of the coffee exported from India is washed coffee prepared under European supervision, many of the small native planters selling their produce to neighbouring European planters or to the special firms that do a considerable trade in pulping and peeling coffee. At the same time, there is by no means an inconsiderable trade in unwashed or native coffee,—that is, coffee prepared by the crude native process to which reference has been made. Mr Pasteur, in his report of the coffee shown at the samples shown at the paucity of the would seem to commend the young industries,

Exhibition, they are quite suitable for our home consumption, and form an important item of the Indian production." The returns for the coffee districts of India show Madras to have nearly a third of its coffee area owned by natives, Coorg about one half, and Mysore fully four fifths. These facts give some idea of the extent of the probable production of native or unwashed berry in India.

1000/000 The average export of the year 1890-1891 was 1000/000 cwt. howe Coch sent 1 impo supply, as a rule, to the Ceylon and Aden. Bombay receives most of this coffee, a little goes to the other ports. of the total exports shipped chiefly from India of foreign and Madras.

COFFEE
arabica

Trade in Coffee

TRADE

two largest consumers of Indian coffee. During the past five years the coasting trade which consists chiefly of despatches from Madras to places within the presidency and to Bombay, has averaged in quantity 70,000 cwt. and in value Rs 22 lakhs.

Towards the close of the account given, on a preceding page of the History of Coffee, Mr Pasteur's statement regarding the decline of the Ceylon trade has been quoted. With the discontinuance of a large part of the Ceylon cultivation the greatest hopes were entertained of a bright future for the Indian coffee industry. Prices revived from 1883 to 1887 and during that period the exports to foreign countries maintained a higher level than during any previous consecutive period. During the

advantage of the decline of the Ceylon industry. The Indian foreign trade in coffee has chronically fluctuated. It attained its highest recorded point in 1867, fell to its lowest point in 1868, and then rose to a level with the Madras exports (given at page 473) from 1856-57 to 1867.

COST OF CULTIVATION AND YIELD

So much has been written on this subject that it scarcely falls within the scope of the present article to deal with the various conflicting opinions that have been advanced. According to some writers the profits on coffee cultivation in India are problematic, according to others the in-crease is enormous. Short forest, yielding house, as

follows —

	R
1st year	7 160
2nd year	3 300
3rd year	4 450
Instruments	700
Buildings and roads	1,830
TOTAL	17 400

This estimate, he states, is applicable to Coorg and Wynad, more especially the former, but he only allows Rs 125 a month for European supervision. He proceeds to state that the third year is supposed to make a return. The average produce of an acre is estimated at 7 cwt., but we could not do better than keep on the safe side and take the produce of an acre at 5 cwt. The 200 acres will yield 1,000 cwt. of coffee. The cost of cultivation is Rs 17,400 per acre, on which the net profit is Rs 1,000 per acre.

Cost of Cultivation

COFFEA
arabica.

COST

the erection of a pulping house, and other accessories to the preparation of the bean but Dr Shortt adds with reference to this that 'these will at best form but a small item'. But he has omitted apparently to estimate for the purchase of grass and forest land, and to take into consideration the cost of the labour of preparing the beans.

The author of the valuable article on coffee planting in *Spens' Encyclopedia* gives several estimates both for India and for Ceylon. He states 'The following estimate (in rupees) for coffee cultivation in South India is based on the purchase of 300 acres of forest land at Rs 50 and 200 acres grass land at Rs 25 bringing 200 acres of the former into full bearing, labour, 4 annas a day, exclusive of maistries' wages.' Then follows a balance sheet the main facts of which may be expressed as follows —

The 200 acres by the seventh year are brought under full bearing and have not only cleared off the expense of the purchase and cultivation of the estate up to date but the plantation has given its owner over and above Rs 971. To continue to work it an expenditure of Rs 644 would be entailed but the return from the crop would be about Rs 1,000 a year so that with a portion of this the estate might now be extended to its full limits 300 acres. This estimate has not only been framed to cover the charge of building all the necessary houses, but to furnish those with pulping and other machinery, and to stock the yard with 100 head of cattle and provide a horse for the superintendent. The capital necessary to organise such an estate (without having to obtain loans on crops) would thus be about Rs 75,000 or say £5,000, and during the fifth, sixth, and seventh years that sum would be recovered. Interest on

is however unable to verify these estimates but since they have been framed by high authorities they may be viewed as approximately indicating the possibilities of the Indian coffee industry when, with average seasons and favourable prices, the speculation is entrusted to careful and skilful supervision.

COFFEA arabica

Diseases of the Coffee Plant

PROFITS.

ready made estates, and pleased their own minds and those of the other shareholders with visions of 50 or 60 per cent of profit. As might have been foreseen, such extravagant hopes have never been realised, the anticipated fortunes having retreated far away into the future, and the 50 or 60 per cent dwindled down to 5 or 6. In many cases, indeed, these adventures have, from various causes, proved complete failures, the balance always being on the wrong side, and, taking them as a whole, the results have been such as to render the public distrustful of coffee culture as a safe or profitable investment, and to lower greatly the value of estates" (*Report on the Ravages of the Borer on Coffee Estates*)

DISEASES. 1675

DISEASES OF THE COFFEE PLANT.

There are many diseases of the coffee plant, and these are numerous, man all of them belong to this class, below which are generally believed to be due to want of depth of soil, but climate and bad cultivation may have also to do with it. Rot or the withering of the young leaves is due to wet and cold.

There are, however, certain specific diseases some of which have practically baffled both the planter and the scientists, and have proved so disastrous as to have ruined the plantations in large tracts of country. This has been the case with Ceylon, the leaf blight having there proved so far incurable as to have caused the planters to substitute tea for coffee on their estates. Numerous reports have been published such as those by Marshall Ward, Nietner, Bidie, Harman, Forbes Watson, Morris, Cooke, Balfour, &c. To review even briefly all that has been written on the diseases of the coffee plant would take up far more space than can be afforded in the present outline of the coffee industry. It may be said that the specific diseases are referable to two sections—*Fungoid* and *Insectiform*.

The chief Fungoid diseases are—(a) *Leaf blight*—This is a fungoid disease which is supposed to have first made its appearance in Ceylon in 1869 and to have appeared in South India two years later. It has since appeared in Java and Sumatra, but does not seem to occur beyond the limits of the Indian Ocean. It is caused by the fungus *Hemuleia vastatrix*, an organism allied to mould. It attacks the underside of the leaves, in the form of spots or blotches, at first yellow, but which ultimately turn black. These spots are covered with a pale yellow powder. They eventually extend over the whole surface of the leaf, which then drops from the plant. It is not a developing or ar, but in its in the form of k and leaves ial cure, but with little success. If powdered sulphur, alone or mixed with caustic lime, be blown over the plants and scattered on the ground below the boughs, the disease is prevented and the coffee plants seem at the same time to be benefited. This is, however, expensive and is more a preventative than a cure. When once the disease has taken hold of the leaves nothing has yet been discovered that will destroy it without at the same time killing the leaves.

(b) *Leaf rot or Candelillo* is a disease attributed by Dr. Cooke to the fungus *Pellicularia Koleroga*, Cooke. It is prevalent in Mysore plantations in July, the leaves, flowers, and berries becoming covered with a shuny

Diseases of the Coffee Plant

COFFEA
arabica

DISEASES

gelatinous substance which turns black about the time that the affected parts fall from the plant (*Kew Reports 1879 30 and 1880, 15*)

II Of the INSECTIFORM diseases met with in India the following are those which give most trouble —

(c) *Borer* — This pest used to be known as the “worm” and “coffee fly.” It is most troublesome in South India, especially in Coorg and the Wynaad, where in 1865-66 it destroyed whole estates. It has been determined as the beetle *Xylotrechus quadripes*. It is red or yellow, with black in transverse lines. It damages the trees by boring holes into the stem usually a few inches above the ground. These passages are at first transverse but soon ascend spirally to the growing tip where the larvae are matured. The plant early shows signs of death, and ultimately withers down to the point where the beetle entered. This pest is most prevalent in hot exposed gardens, and may be kept in check by free irrigation.

destruction of the parts to which it adheres the flowers and young fruits falling freely. The pest does not do much harm however until it has been two or three years on an estate. It prefers cold damp plantations at about 3000 feet in altitude. This bug may be first recognised as brownish wart-like bodies. These are the females each of which produces some 700 eggs. Fortunately this pest is freely attacked with parasites which greatly help the planter.

The black bug is known as *Lecanium nigrum*. Like the preceding this attaches itself to the tenderest shoots. It also prefers gardens at high altitudes in damp situations. The female somewhat resembles a scollop-shell. When the eggs are incubated the twigs become covered with an
the young berries
what like a wood-
e. It is flat, oval,
ng across the back.

It seems to prefer hot dry plantations and disappears with the rains, only to return in time to destroy the setting of the fruits. It is found on the roots about a foot below the surface of the soil in the axils of the leaves and among the clusters of flowers and young fruits. It may be easily recognised by the white excretion formed around the larvae.

All these and the other less known coffee bugs have a strong dislike to tobacco juice. They may be prevented from developing to an injurious extent by brushing the twigs with tobacco. Some planters recommend saltpetre and quicklime in equal proportions dusted on to the affected

COFFEA
arabica.

Diseases of the Coffee Plant.

DISEASES.

by hand has been tried, but it can only be attempted upon young trees without crop; and Mr. Nietner, although allowing that an immense

now is " (*Balf Cyclop*)

(e) *Grub*—The larvæ of the moth *Agrostis segetum* are very destructive: this disease is known to the planter as "Black Grub." It appears about August to October. It lives in the ground, but during night comes out to feed and does much harm when very plentiful. It is, however, local, preferring certain parts of the estate, but does not confine its ravages to the coffee plant only, as it eats any cultivated plant—vegetable or fruit tree—but despises weeds. It is very destructive to young plants. Mr. Nietner states that he lost as much as 25 per cent of his seedlings through this pest. The "White Grub," this includes the larvæ of several species of *Melolonthidæ* or Cockchafer. These do much damage by eating the roots of the trees. Mr. Gordon considers them as one of the greatest ene-

berries form the so called Jackal Coffee.

COFFEE-
LEAF TEA.
1676

COFFEE-LEAF TEA.

It has long been known that coffee leaves, if cured by a process similar to that adopted with tea leaves, afford a beverage which contains sufficient caffeine to entitle it to a position as a cheap substitute for tea or coffee. Indeed, according to some writers, the leaves contain more caffeine than the berries. A decoction from the leaves is said to be regularly used by the inhabitants of Sumatra, especially at Padang. A Mr John Gardener of London even patented a process for manufacturing and partially roasting the leaves, from the belief that they were likely to come into use in Europe. Unfortunately, however, the leaves have an unpleasant senna-like flavour which greatly militates against their chances of European popularity. But perhaps the chief objection to coffee-leaf tea rests on the fact that the plants will not afford both a crop of leaves and fruits, and the latter is therefore never likely to be subordinated to the former as a commercial article. But for this fact coffee-leaf might be sold at 2d a pound as compared with tea at 10d.

The following note has been furnished for this work by Prof. Warden of the College Medical College—

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but during

The Uses of Coffee

COFFEA
arabica.

the roasting of the berries a larger amount is developed, to which the aroma is due. Caffeine appears to act as a stimulant to the nervous system. Coffee leaves have been used as a substitute for the berries; they contain caffeine. Mr N M Ward of Padang writes regarding the use of the coffee leaves as follows: 'I was induced, several years ago, from an occasional use of the coffee leaf to adopt it as a daily beverage, and my constant practice has been to take a couple of cups of strong infusion with milk in the evening as a restorative after the business of the day. As a beverage the natives universally prefer the leaf to the berry giving, as a reason, that it contains more of the bitter principle, and is more nutritious.' The best mode of roasting is by holding the leaves over a fire made of dry bamboo or other wood which gives little smoke. When sufficiently roasted the leaves have a buff colour, they are ground to a powder and used in the same way as coffee. (*Hanbury*)

COFFEE PULP

COFFEE
PULP.
1677

It has long been known that the ripe pulp of the coffee cherry contains an amount of sugar which might with advantage be converted into alcohol. At present the washings from the pulping machine are run off and no advantage taken of the sugar they contain. Several writers have urged the planters to utilise this by-product, but as yet no definite steps have been taken in that direction. It is indeed even questionable whether or not it would pay the planter to divert his attention to a perfectly distinct enterprise. The tendency of the present day is to enable the manufacturer in every branch of industry to compete to the last degree by affording him the means of deriving additional revenue from the waste or by-products of his industry. In this light it seems possible

to employ the waste of the coffee husk in the preparation of the infusion known as *kahwe* or *kischer*. Dr Shortt states that according to his experiment 8 oz of dried husk, when steeped in water until fermentation sets in, yielded on distillation 1 oz of spirits. If not employed in this manner, might not the dried husk find a demand as an auxiliary to cattle food?

OIL

OIL
1678

The term 'Coffee-oil' is in the trade given to palm oil in which the kernels have been more or less burnt during the process of extraction.

The term 'Coffee-oil' is in the trade given to palm oil in which the kernels have been more or less burnt during the process of extraction. The aroma might be restored to the coffee or employed to flavour liqueurs. This empyreumatic oil is formed during the roasting, and probably at the expense of caffeine and other constituents of the coffee (see under Chemistry).

MEDICINE.

MEDICINE
1679

Coffee while not official in the British Pharmacopoeia is so in that of the United States of America. Many medical men, however, recommend its use in England for mild affections. Its dietary property, as a

COFFEA
arabica.

The Uses of Coffee.

MEDICINE.

stimulant to the nervous and vascular system, is that upon which its claims to medicinal recognition depend. It produces a feeling of buoyancy and exhilaration resembling the first effects of alcohol, but it is not followed by depression and collapse. It increases the frequencies of the pulse, and stimulates the system to throw off feelings of fatigue, or to sustain prolonged and severe muscular exertion. It has even been contended that caffeine has the power of checking the waste of the tissues. Lehmann found that the distilled oil had this effect in quite as strong a degree as tea. The well-established property of coffee in preserving wakefulness depends upon its stimulating property on the nervous system. When swallowed it produces a warming cordial impression on the stomach, quickly followed by a diffused agreeable nervous excitement which extends itself to the cerebral function giving rise to increased vigour of imagination and intellect without any subsequent stupor such as follows on the use of most other stimulants. Moleschott found that it

cient energy of the brain are manifested without congestion or inflammation. In light nervous headaches, not proceeding from derangements of the stomach it often proves immediately effectual. It has acquired much reputation as a palliative in the paroxysms of spasmodic asthma, and has been recommended in whooping-cough and in hysterical affections. "Hayne informs us that in a case of violent spasmodic disease,

highly recommended in cholera infantum, and it has even been used with asserted advantage in cholera. It is said also to have been used successfully in obstinate chronic diarrhoea" (*United States Dispensatory*).

Coffee is much less astringent than tea, and hence it does not cause constipation so readily.

Wood states that "upon those who use it habitually, its characteristic influence is not fully evinced, as it has either lost its power in a great

tonic to the digestive organs, and more astringent in consequence of the amount of tannic acid it contains. Certain it is that tea, especially black

Pharmacology, I, 625)

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Chemical Composition of Coffee

COFFEA
arabica.

MEDICINE.

coffee in France is supposed to have abated the prevalence of gravel in that country. In the French colonies, where coffee is more used than in the English, as well as in Turkey, where it is the principal beverage, not only gravel, but gout, is scarcely known."

Unroasted coffee has been employed in intermittent fever, but it is much inferior to quinine. Roasted coffee is said to have the effect of imposing animal and beneficial application

coffee, burnt in the wards of a hospital early in the morning, is a deodoriser, and a very fragrant one" (*P. Kinsley, Honorary Surgeon, Chicacole, Ganjam, Madras Presidency*). "Is also an antispasmodic, when consumed in large quantities, is supposed by the Arabs to have an anaphrodisiac effect" (*A S G Jayakar, Surgeon Major, I M D, Muskat, Arabia*). "Dried coffee roasted in an open vessel is a useful deoderant" (*Henry David Cook, Surgeon-Major, Calicut, Malabar*). "Is an antidote in opium-poisoning" (*G. A. Watson, Allahabad*).

CHEMISTRY.

CHEMISTRY.
1680

The roasting or torrefying of the coffee-beans, combined with the pulverising they are afterwards subjected to, induces certain changes to which in a large measure the flavour and aroma of the coffee are due. The woody tissue becomes friable, and at the same time certain chemical changes take place. The chief organic constituents of raw coffee are caffeine, fat, caffeic acid, gum, saccharine matter, legumin, and cellulose. Payen gives the following analysis —

Cellular tissue	34 000
Hygroscopic moisture	12 000
Fat	13 000
Starch, sugar, dextrin, and vegetable acids	15 500
Legumin	10 000
Chlorogenate of potash and caffeine	35 500
Nitrogenous matter	3 000
Free caffeine	0 800
Thick insoluble ethereal oil	0 001
Aromatic oil	0 002
Mineral constituents	6 697

Bell (in his *Chemistry of Foods*) gives the following table of the analysis of two samples, raw and roasted, of both Mocha and East Indian coffees. We reproduce the table, both because of its allowing of comparison between these two coffees and of indicating some of the chemical changes effected by roasting. —

Constituents	MOCHA		EAST INDIAN	
	Raw	Roasted	Raw	Roasted
Caffeine	1 05	82	1 11	1 05
Saccharine matter	9 55	43	8 90	41
Caffeic acids	8 40	4 74	9 58	4 52
Alcohol extract, containing nitrogenous and colouring matter	6 90	14 14	4 31	12 67
Fat and oil	12 60	13 39	11 81	13 41
Legumin or albumin	9 87	11 23	11 23	13 13
Dextrin	87	1 24	94	1 38
Cellulose and insoluble colouring matter	37 90	48 60	35 60	47 42
Ash	3 74	4 56	3 03	4 88
Moisture	8 98	0 63	9 64	1 00
	100 00	100 00	100 00	100 00

COFFEA arabica.

Chemistry of Coffee.

CHEMISTRY.

Should the whole of the testa of the seed (the silver skin of the plant-)

roasted together, the coffee will be much inferior to that obtained by roasting carefully picked and assorted beans. The degree of roasting required for one class of coffee is not the same as that for another. The heat should not be greater than is sufficient to impart a light brown colour to the bean. When roasting is carried too far, a disagreeable smell and a bitter and acrid taste gradually mingle with the essential aroma, and thus lessen the merit and value of the coffee. By reducing the beans to charcoal the aroma and flavour are entirely destroyed. When the roasting has been effected to the right extent, the volatile oil is produced at the expense of some of the other constituents. A glance at the table above will show that nearly the whole of the saccharine matter has disappeared. This is not the case with the sugar in chicory or other roots, a large proportion remaining as sugar, and hence the rapid colouration imparted to water by a coffee powder containing chicory or other cane-sugar-yielding roots, as compared with pure coffee. There is something altogether peculiar in the behaviour of the sugar of coffee under the influences of torrefaction. How the volatile oil is formed seems to be a puzzle. This oil has been termed Caffeone, and it is the aromatic principle of coffee. It is wholly the product of torrefaction, the materials of which it is formed being obtained by the destructive influence of heat on the

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roasting, takes a simil
beverage produces"
principle upon which
not appear to be alter
found in tea. Weight for weight, tea yields about twice as much theme
as the roasted coffee-beans yield caffeine. On this account a greater
of nutrit-
ling (as
the full

nutritive property of the bean is secured. Several writers have strongly
advocated the adoption of this practice, but it seems doubtful whether this
is ever likely to be followed more than that the tea leaves should be eaten
with
ins
erior
sung

in stock pursued in England, packets of the ground coffee being sold to
the consumer which may be years old, is far inferior to the continental
system of the consumer roasting and grinding his own coffee in small
quantities as required.

Structure of the Wood —Wood white, moderately hard, close-grained
Pores very fine and extremely fine, medullary rays very fine, numerous

Liberian Coffee; Job's Tears

COIX
Kœnigii.

LIBERIAN COFFEE

LIBERIAN
COFFEE.
1682

The Liberian Coffee is a native of Liberia, Angola, Go-
West Tropical
a, yielding also
rope about the
on. Its hardier
able to withstand the action of
ured in to the Royal Botanic
perimentally tried. Fortu-
able to meet these demands
until the question of seed-supply was taken up by certain recognised mer-
chants. The Kew Reports are full of the most interesting details regard-

Ceylon have chosen to supplant their coffee by tea, and while the reports
issued by the Superintendent of the Nilghiri Gardens continue favourable,
the enthusiasm with which Liberian coffee was first received seems to
have toned down considerably, leaving the matter still in an experimental
position

COIX, Linn., Gen. Pl., III. 112.

leaves"

Coix gigantea, Koen, Duthie, Fodder Grasses, N Int, 18; GRAMINEÆ

1683

Vern - Kesai, BEHAR; Danga gurgur, BENG

Reference.—Roxb, Fl Ind, Ed C B C, 650

17 C. B. C. 650

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to have observed them under cultivation, and thus, while the grains are
not apparently eaten, the other properties of Coix lachryma are appli-
cable to the above.

C. Kœnigii, Spreng; Duthie, Fodder Grasses, 19.

Syn. for CHIONACHNE BARBATA, R. Br (the COIX BARBATA, Roxb.)

1684

C. 1684

COIX
lachryma

Job's Tears.

Kurz in hie
Kyaib
names C
BALAGH

FODDER.
1685

Fodder —Duthie says that in Balaghât in the Central Provinces, it is said to be used as fodder when in the young state Roxburgh, however, remarks that, owing to its coarse nature, cattle do not eat the grass

1686

Coix lachryma, Linn , Duthie, Fodder Grasses, 18

Job's TEARS

Syn —C ARUNDINACEA, Lamk , LITHAGROSTIS, LACHRYMA JOBI, Garin

Vern —A recent correspondence between the Government of India and the

NAKEN *Audnia this* or *kuahasi* (the black form), *su isa* (the white form), *he si* or *kasi* (collective or generic name), NAGA HILLS, Mung, MANIPUR, *Kirindi-mana*, SING, *Ee jin, ee-yin*, a name used in China and Malacca

hence according to them *Inula* and not *Coix* would be the true Job's

Pl,
357, Dymock, *Mat Med W Ind*, 2nd Ed, 853; Balfour, *Cycl Ind t*
Hooker's Him Jour, II, 259

Hah tat —Moo t. —at. t. . . . of

Job's Tears.

COIX
lachryma,

tea, and appear to occur at higher altitudes. They are also more stunted in growth, and the involucre (or shell around the grain) is looser, softer, and apparently always furrowed—at least this is so with all the cultivated forms.

THE FORMS OF JOB'S TEARS.—There are three or four well marked forms of Job's Tears met with in India, which differ from each other in shape, colour, and degree of hardness, and in the presence or absence of

FORMS OF.
1687

only smooth and polished

The writer has had the pleasure to examine a large collection of samples made in Burma and Assam, and would offer the following remarks regarding these

1st.—The cylindrical form—met with in the Pegu Divisions, Pegu, Hanthawaddy, and

this berry." It would appear, therefore, that the cylindrical grain may occur in the Mni country, but up to date (in connection with the present enquiry) no information corroborative of this fact has been received from Assam, and the plant does not appear to occur in any other part of India, so that it may safely be viewed as a native of Burma, and possibly distributed into the mountain tracts of Upper Assam and Cachar. The cylindrical grain is always of a white colour, smooth, polished, not furrowed, but constricted towards both extremities and whether wild or cultivated, is collected for ornamental purposes only, and not as an article of food.

2nd.—Of the pear-shaped form there are numerous sorts, varying in size and colour—some pale and bluish white, others grey, yellow, or brown-black. They are often constricted at the base into a disk-like annulus,

and are so hard and brittle that it can scarcely be broken. The cultivated

It seems probable these belong to a different plant from the forms described above.

COIX
lachryma

Job's Tears.

FORMS OF.

It is somewhat remarkable that in all the cultivated forms the shell is

the means of recording the vernacular names that are in use with reference to the various wild and cultivated plants.

PEGU DIVISION.

BURMA.
Pegu.
1688

In the Pegu District five forms of a pear-shaped kind known as *cheik* or *kyekthi* which gr for food or for ornamental ; white, the other brown grey,

A brown edible form is cultivated—a polished grain with the characteristic of *var stenocarpa*, long, thin, and slightly swollen, bluish the cylin

dricl from the pear-shaped forms. The best quality is said to come from the upper valley of the Pegu river

In *Hanthawaddy District* some seven or eight forms exist in a wild state or are cultivated. One only is grown as an article of food, namely, a slaty brown irregular grain, of a dull colour, furrowed, and with an annulus. This is found only on the plains, is called *Kyekthi*, and is sold for 8 annas a basket. All the others are wild or cultivated, but collected purely for ornamental purposes. One is a medium-sized steel grey seed, smooth, shining, and pear-shaped. Three are pinkish brown, small, of the flattened spheroidal form, and the most perfect beads in the whole collection of Coix seeds before the writer. These have been lettered B D and

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bove under

Pegu, the sample marked G, agreeing with the so-called "male," and C with the "female" form

In the *Prome District* both spherical and cylindrical forms are said to occur, wild and cultivated. Of the samples forwarded along with the writer, must be the longer form. The Deputy

Job's Tears.

COIX
lachryma.

FORMS OF,

Commissioner deals in his report with a much more extensive series than he has furnished samples of. He says the forms of Coix are known collectively by the name *Kyeikthe*. The cylindrical being *Kyeikshe* (literally, long *Kyeik*), of the globular form there are names to distinguish certain recognised types thus — *Kyeikphun*, white *Kyeik*, *Sakyeik*, edible *Kyeik*, *Pyaung*, or maize-like *Kyeik*, and *Kyeikm*, or red *Kyeik*.

In the *Tharrawaddy District* the Deputy Commissioner says that all the forms are known by the Burmese name *Kyeikthe*, but that a large round edible form is known to the Karens as *Bè*, and is cultivated, while another smaller round kind is known as the *Be-ma* (or female *Be*) and is collected for ornamental purposes. He further forwards a sample of the cylindrical grain, and says it is known as the *Be-kwa*.

ARAKAN DIVISION.

Arakan.
1689

In the *Akyab District* the pear-shaped form is both wild and cultivated. From the town of Akyab, the Deputy Commissioner has furnished three samples of the wild plant, the seeds being smooth, polished, and very hard, especially a brown form. He states that these forms grow in the low marshy lands and are not eaten. He, however, furnishes a sample of a cultivated form obtained from Myohaung—the largest Coix grain yet examined—which fully supports all that has been stated above. It is steel grey, deeply grooved, with a loose shell and pronounced basal swelling. The Deputy Commissioner describes this as “the cylindrical form,” but while it is certainly longer than the Akyab grain, it is not the cylindrical form (*var stenocarpa*) described above, but is a monster form of the ordinary cultivated pear-shaped grain.

In the *Kyaukpada District* three forms of Coix occur—two wild and one cultivated. The writer has not seen any specimens of these, yet has no reason to doubt but that they would answer very much to the types described under Akyab. One of the wild forms is larger than the other and is known as *jaisee* or *kalinsee*, while the smaller form is the *chitsee*. The edible form is also known as *chitsee*, and is both eaten and made into beer.

TENASSERIM DIVISION

Tenasserim.
1690

In the *Amherst District* both the round and cylindrical forms are grown, the former being eaten, and the latter used for ornamenting ladies' dresses. A wild round form is said also to exist. Samples have not been communicated, but the Deputy Commissioner reports that both are known as *kzeit*.

In the *Shwe-gyin District* no form of Coix is known.

In the *Taung-ngu District* it is stated that the cylindrical form grows wild, while the globular is cultivated; both are known as *kzeit*; the former

wild, while Nos. 3, 5, 6, and 7 are used for ornamental purposes, and No. 4 is extensively eaten. It is worthy of note that of these samples only those cultivated, *viz.*, Nos. 1, 2, and 4 have the shell or involucre furrowed—the others are smooth and shining.

(1) *Kalin* is a dark brown or bluish black polished grain of the pear-shaped series.

COIX
lachryma

Job's Tears.

FORMS OF.

- (2) *Kaleik Kauk-nyin*, the same as the last so far as the appearance of the grain goes
- (3) *Kaleik S* — as "male"
- (4) *Kaleik F* grain in tation, is
- (5) *Kaleik Yingwe* — This is a very small form of the flattened spheroidal, grain of a dirty milky white colour, a little smaller than the Hanthawaddy sample marked D, but of the same shape. The seeds are less than a $\frac{1}{2}$ inch in diameter and not much more than half that size in thickness through the central perforation
- (6) *Kaleik Yang*, the form of *stenocarpa* that has been described as
- (7)

of the steel grey whites are quite as large as No 7, but few of the straw

In the S cultivated, t Burmese as *kynthlon* cylindrical the cylindri cylindrical and *Tabuse* the globular Both forms are extensively grown in the Shan States, where the cylindrical is sold for R1 a bushel and the globular from 4 to 6 annas

The following abstract of available information regarding Coix cultivation in Assam may be here given to complete this brief review of the subject —

Sir J D Hooker remarks "A great deal of Coix is cultivated in the Khásia hills, the shell of the cultivated sort is soft, and the kernel is sweet, whereas the wild Coix is so hard that it cannot be broken by the teeth, each plant branches two or three times from the base, and

the produce is strictly cultivated

SIX VARIETIES OF JOB'S TEARS The generic name is *Job's tears*, and the varieties are as follows —

'*Sibu*'—The seed is of a bluish grey colour and pear-shaped in

Herengisa-si —Of the same colour as *Sibu*, but more pear-shaped. Hardly to be distinguished in fact, from *Sibu*, except in being set brown rain, with ly hard to

admit of its being used for ornamental purposes

"*Samapre*"—Pear shaped in form resembling *Sibu*, but smaller in size. This dark brown regular grain looks at first sight remarkably like some of the forms of black rice. It is about the same size and is pointed at both extremities. It is considerably like an elongated caraway.

Job's Tears

COIX
lachryma.

FORMS OF

"*Kadatha*"—Almost globular in form, of a mottled brown and grey colour. The most marked peculiarity of this grain is that it is dark brown like the *Sipta* form in the lower half and yellow or straw-coloured in the upper.

"*Kasi*"—Globular in form of a light grey or yellow colour. This is the most common variety.

The Naga hill samples, examined by the writer, fully support the

Naga Hills

purposes. It may also be added that the average elevation of the Naga and Khasia hills may be put down at from 3 000 to 5 000 feet whereas the smooth-shelled forms are met with chiefly in the marshes of the plains of India and Burma. The white forms of the Khasia hills are harder, more polished and less furrowed than the cultivated white forms from any other part of India, but they still preserve the characters assigned collectively to the cultivated forms. From the Khasia and Jaintia hills two samples of Coix have been received both of the milky white kind. A large and a small grain from the latter resembles very much the small white grain obtained from Mergui (No 4 above) only

Khasia Hills.

The dark coloured forms are said to boil softer than the white and the smaller of the two white forms "is slightly better flavoured than the larger."

Food—This curious grain might almost be said to be unknown to the natives of India generally, except as a weed of cultivation. To the hill tribes on the eastern frontier, however, it is an important article of food, with the Tankhul Nagas of Manipur it might, indeed, be almost described as the staple article of diet. In several districts of Burma it is also regularly grown as an article of food. Mason says the esculent Coix cultivated by the Red Karens is parched like Indian corn. Of the Bassem district Mr W T Hall (*Director of Land Records and Agriculture*) reports that it is sown in gardens, the crop ripening in November. The produce sells for Rs 2 to Rs 3 a bushel. That officer has also forwarded to the writer numerous reports received from the Commissioners of the various Divisions, from which the following account of the method of cultivation may be here reproduced.—The mode of cultivation is as follows—*1st*, before the seeds are put in the ground they are tied in a piece of cloth and watered every day for about 7 to 8 days, when whitish roots appear. They are then placed in the ground. In some cases the roots do not appear till 10 or 15 days. *2nd*, at the place where the plants are to be grown furrows are formed and the seeds are laid on the earth which is first mixed with cow's dung, afterwards the seeds are covered up with a little

FOOD
1692

ed leaves

onsidered

becomes

This will

cause the plants to yield another crop and thus to last much longer." Speaking of the cultivation pursued in Akjab the Deputy Commissioner writes (of the Myohung township) with reference to the form which he calls "the cylindrical," but which, according to the samples discussed above, is a large loos shelled grain of the pear-shaped series—

COIX
lachryma.

Job's Tears.

FORMS OF.

"The cylindrical is sown by the wild hill tribes on Kaing land or on the slopes of hills. They do not till the land for this purpose, the seeds are thrown broadcast, and no care is taken of them. In times of scarcity of food the cylindrical are eaten, but now they are only used as ornaments for their dresses." The Deputy Commissioner of Kyaukpau writes regarding a beautiful hard round form which is collected from the wild plant and used for ornamental purposes. Of the cultivated forms he says this is known as *Chitsee*. "It grows in June and July and dies in November and December. The plant is 4 or 5 feet high and like a reed." But a smaller, more delicate, variety is also cultivated, which he remarks is eaten and also used in the manufacture of the small beer known as *Khanag*. He adds, "The seed has to be cleaned and has the taste of maize." Of the two kinds grown he says, "The plants, however, differ widely in other respects, and I am unable to say if they belong to the same variety or not."

CHARACTER OF THE EDIBLE GRAIN—On breaking the outer shell, a cown-shaped grain is obtained which, Professor Church says, bears on being cleaned the proportion of 1 to 4 to the total weight of the unhusked article. The Professor gives the following analysis—

Composition of Job's Tears (Husked)

	In 100 parts		In 1 lb	
Water	.	13.2	2 oz	49 grs
Albuminoids	.	18.7	2 "	434 "
Starch	.	58.3	9 "	143 "
Oil	.	3.8	0 "	364 "
Fibre	.	1.5	0 "	105 "
Ash	.	2.1	0 "	147 "

"The nutrient-ratio is here 1 : 3.8, the nutrient value 89." From these facts it may be inferred that the grain is not likely to prove of greater economic value than it at present is to the poor hill tribes who

sequence of
e will grow
and coarser
it is sold for
for hospital
in the exten-
patients in China. It is worthy of note, however, that

sive series of cultivated forms which exist, and the occurrence of a long list of names for the plant and grain in nearly every vernacular language of India and Burma, an indication is given of an ancient cultivation

and through the Malayan

If this, possible
abandoned
has
partly
also be
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occur
culti-

anywhere in India proper
vated anywhere in India at
Hills some five or six forms of the loose-shelled and burrowed and are
grown, but the plant is said to be rarely, if ever, met with in the wild
state, while the cylindrical is reported as wild in the Naga Hills but never

Job's Tears	COIX lachryma.
cultivated municated, t from the exte whom he is	FORMS OF.

word, are — The cylindrical form is only found in the wild state and is called *sikra*. This plant is never cultivated but is found growing on the edges of terraced cultivation, and in the small gardens in the villages. The leaves resemble closely those of the cultivated species, but the plant is smaller and the stem much tougher. The seed is used, in place of

the beginning of the world rats brought paddy and *sikra* from Japvo Mountain. Man on seeing these products, took the paddy for himself and left the *sikra* for the rats." Japvo is the highest peak of the Naga system where neither wild rice nor wild coix occur. The writer does not recollect having ever seen the cylindrical form in the Naga Hills, although he collected numerous samples of the globular, but all under such conditions as to lead him to the opinion that they were cultivated forms or at most only escapes from cultivation.

Medicine — In some parts of India medicinal properties are assigned to the grain, as, given in strange
A Campbell)

Domestic U

MEDICINE.
1693

DOMESTIC.
Necklaces.
1694

made in the Nepal Lari. The Karens cover their dresses with the

Earrings
1695

Artificial
flowers.

1696

Laces,

1697

Bugle-

trimmings

1698

Rosary beads.

1699

seeds suitable for the above purposes. The writer was not able at the time to furnish these gentlemen with samples of the cylindrical seed to which repeated reference has been made above, but he gave them samples of the ordinary edible pear-shaped form. They seemed to think there might be some prospect of even that form coming into use. On being shown the Karen ornamented dresses they professed a firm conviction that the cylindrical grain would find a ready sale. This led the writer to show these garments to Mr W T Threlton Dyer, Director of the Royal Botanic Gardens, and in consequence a requisition was in due course forwarded to the Government of India asking that a thorough

COLA
acuminata.

Job's Tears; Cola Nut

DOMESTIC

identified as *Polytoca Wallichiana*, but have since been determined as *C. lachryma* var. *stenocarpa*. Subsequently, numerous samples of Job's tears, from every district in Burma, were obtained, and it has transpired

PRICE.
1700

form would afford the manufacturer of laces, &c., a choice of two forms which might be elegantly combined

PRICE OF COIX GRAIN—This has been variously estimated at from 8 annas to R4 a basket, but it seems probable that were a regular de-

established, which would pro-
It would have, however, to be
be cultivated without losing
as decorative articles The

be the produce
ox lachryma),
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cultivation of
vell, and were
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land, the price
being cultiva-
ent the plants
also in lower

Nepal, to such an extent that no fears need be entertained of the demand, for some time to come, exceeding the supply.

Coke, see Coal

COLA, Schott; Gen Pl, I, 218.

1701

Cola acuminata, R Br, STERCULIACEÆ

Syn.—*STERCULIA ACUMINATA*, Beauv

References.—*Ken Reports*, 1880, p. 14, 1881, p. 10; *Christy New Com-
mercial Plants*, No. 8, p. 5; *Treasury of Botany*, p. 311; *Smith Dict
Econ Pl*, p. 127; *Balfour, Cycl of India*, U. S. Dist., 15th Ed.,
p. 1754; *Pharmaceutical Society Journals*

It has been experimentally intro-
rom
dily
ma

Cacao) It has been said the beverage made with Cola paste is ten
The reputation of
e is such that it is
ives of the world as

and Schlagden-

There are many tracts of country in India that seem likely to prove
suitable to Cola cultivation, and doubtless this subject will in the future
receive a greater degree of attention than it has as yet obtained from the
Indian planters

C. 1701

Official Colchicum

COLCHICUM
autumnale.

COLCHICUM, Linn., Gen. Pl., III, 821.

Colchicum autumnale, Linn.; LILIACEÆ

OFFICIAL COLCHICUM, MEADOW SAFFRON OR AUTUMN CROCUS.

1702

References.—*Pharm Ind.*, 243; *Flick & Hanb. Pharmacog.*, 699; *U. S. Dispens.*, 15th Ed., 469, 470; *Bentley & Trim. Med. Pl.*, 288; *Mat. Ind. Preface*, xxi; *Encyclop. of Pharmacy*, 1874, p. 103; *Cyclop.*, 808; *Balfour, Morton, Cyclop. Agr.*, 490.

Habit.—The plant grows in the meadows throughout Europe. Attempts have been frequently made to introduce several species into India, but with very little success. Mr. Baden Powell says that in the Panjáb a species of Colchicum is known as *Harantutiyā*.

The fresh corms and the seeds of Colchicum are official.

C. sp.

1703

Ve surinam, HIND,
M 74, U. S. Dispens.

variety and the bitter, but adds a third form or rather substitute which he says is the sliced bulbs of *Narcissus tazetta*, which are imported from

chicum variegatum, Linn., a native of the Levant and not known to be found in Kashmir or Persia. Planchon in his account of *Súrinyān* gives a figure of *C. variegatum*, Linn., in the *Bot. Mag.*, t. 1028.

References.—*Royle, Ill. Him. Bot.*, 365; *Baden Powell, Pb. Pr.*, 381; *Journal*, April 1871.

Journal, April 1871

HISTORY.
1704

COLDENIA
procumbens.

The Surinjan; Trailing Coldenia.

HISTORY.

Mir Muhammad Husain tells us in his *Makhzan* that the white is the best, and that it is not bitter, next the yellow, both may be used internally, the

MEDICINE
1705

and aperient, especially useful in gout, rheumatism, liver, and spleen. In gout they combine it with aloes, with ginger and pepper it is lauded as an aphrodisiac, a paste made of the bitter kind with saffron and eggs is applied to rheumatic and other swellings, the powdered root is sprinkled on wounds to promote cicatrization. Two kinds of *Surinjan* are met with in Indian shops, bitter and sweet. European physicians in India who have tried the drug consider the sweet *Hermodactyl* to be inert or nearly so, and the bitter to have properties similar to *Colchicum*.

Medicine.—§ "Purgative, diuretic, sedative, chologogue, doses 2 to 8 grains, use—
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constipation
Lall, 1st c
Fubbulpore
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Assistant-Surgeon, Meerut
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ary,
ter,
foss,

Colchicum luteum, *Baker*, according to Aitchison, in a note furnished to the writer, "occurs in early Spring in the Panjáb from Campbellpore, across to Abbottabad, the Gullies, at Murres, and in Kashmir extending to Zoja pass.

Probably it is the root of this that is *Haran-tutiya*. But the root of *Merendera Persica*, *Bois* (*Syn Aitchisonii, Houker*) may be mixed with it.

SUBSTITUTES,
1705

SUBSTITUTE OF *SURINJAN*—Dr Dymock says that the sliced bulbs of the true *Narcissus* (*N tazetta*) which are imported into India from Persia as a substitute for *Surinjan* are easily recognisable. He remarks this drug may be at once detected by its larger size and tunicated structure. The taste is bitter and acrid the substance amylaceous and very similar to that of the *Hermodactyl*. It is used as an external application and, according to the author of the *Makhzan*, has properties very similar to those of *surinjan-i-talkh*. Value, annas 3 per lb.

COLDENIA, *Linn*, *Gen Pl*, II, 841.

1707

Coldenia procumbens, *Linn*, *Fl Br Ind*, IV, 144; BORAGINÆÆ

TRAILING COLDENIA

Vern — *Ta Surinjan* : A — *Surinjan* : *Rivka* SIND, Tru.

Habitat. — A small annual weed, usually quite flat, common throughout tropical India, it generally grows on dry rice-fields during the cold season, disappearing about the beginning of the periodical rains. It is common in the hot dry parts of Ceylon. Distributed to Asia, Africa, Australia, and America.

Colebrookia, Country Borage.

COLEUS
aromaticus.

Medicine.—As a medicine, equal parts of the dry PLANT and fennugreek SEEDS rubbed to a fine powder, and applied warm to boils quickly brings them to suppuration (*Ansley*). The fresh leaves, ground up, are applied to rheumatic swellings (*Murray*).

MEDICINE.
Plants
1703

COLEBROOKIA, Sm, Gen Pl, II, 1180

A Himalayan genus, comprising only one species, and that one of the commonest and most abundant plants in the Lower Himalaya and mountains of India, ascending to 4,000 feet in altitude.

Leaves
1709
1710
1711

Colebrookia oppositifolia, Sm, Fl Br Ind, IV, 642, LABIATÆ

Vern.—*Pansra*, HIND, *Shakardana*, *phisbekkar*, *duss*, *samprá*, *sádi*,

References.—*Roxb*, Fl Ind, Ed C B C, 467, *Voigt Hort Sub Cal*,

Habitat—A shrub with grey bark, common on the outer Himalaya,

Mysore It is now viewed as not even worthy of separate recognition as a variety.

Medicine.—The leaves are applied to wounds and bruises (*Stewart*). "The down is used by the Paharias to extract worms from bad sores on the legs (*Gamble*). A preparation from the root is used by the Santals in epilepsy (*Campbell*).

MEDICINE.
1712

Fodder—The leaves are used as fodder for cattle (*Balfour*).

FODDER
1713
TIMBER
1714

Structure of the Wood—Greyish white, moderately hard, close-grained. Weight 46lb per cubic foot. It is used for gunpowder charcoal.

COLESEED or COLLARD, see *Brassica campestris*, Linn, var. *Napus*, B No 810

COLEUS, Lour, Gen Pl, II, 1176

Coleus aromaticus, Benth, Fl Br Ind, IV, 625, LABIATÆ

1715

COUNTRY BORAGE

Syn.—*C. AMBOINICUS* Lour, *Voigt Hort Sub Cal*, 450; *PLECTRANTHUS AROMATICUS*, *Roxb*; Fl Ind, Ed C B C, 466

Vern.—*Pathor chur*, HIND, *Pátér chur*, BENG, *Páthor chur pathár chár*, *owa*, BOHE, *Pathar chár*, MAR, *Páshana bhedí*, SANS. In *Flora Andrica*, *karpára-vallí* is applied to this plant, but Dr Moodeen Sheriff is of opinion, that the name is more in use for *Amisochilus carnosus*, than any other name.

References.—*Dals & Gibz*, *Bomb Fl Supp*, 66, *Pharm Ind*, 168; *Moodeen Sheriff*, *Supp Pharm Ind*, 114 51, *U C Dutt*, *Mat Med Hind*, 313, *Dymock*, *Mat Med W Ind*, 505 *Drury*, *U Pl*, 153; *Lisbon*, *U Pl Bomb*, 168, *Kyle*, *III Ann Bot*, 1, 303, *Balfour*, *Cyclop*

C. 1715

Country Borage; Birds' Nests.

Medicine.—The PLANT "is employed in Cochin China, according to

other suitable vehicle In his own practice he observed it produce so
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ough
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has
the
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much larger quantity than is usual in Bombay.

Special Opinions—§ "Expressed juice of the LEAVES is considered as an anodyne and astringent, and applied over and around the eyelids, in cases of conjunctivitis" (*Anund Chunder Mookerjee, Assistant Surgeon, Noankhully*). "Said by Sanskrit writers to have a specific action on the bladder and to be useful in urinary diseases, vaginal discharges, &c." (*U. C. N. "Cat. Ind. Med. Soc. Calcutta, 1902"*). "Chief in chronic dyspep

able
say
fragrant, they are frequently eaten with bread and butter, also bruised
and put into country beer, cool tankards, &c., being an excellent substi-
tute for Borage."

Coleus barbatus, Benth., *Fl Br Ind*, IV., 625; Wight., *Jc*, I., 143².

Vern.—*Garmal*. BOMB

References.—Vogl, Hort. Sub Cal., 489; Thwaites, En Ceylon Fl., 238, Dals & Gibs, Bomb Fl., 205, O'Shaughnessy, Beng Dispens., 401, Drury, U. Pl., 134, Lisbon, U. Pl. Bomb., 168, Royle, Ill. Hort. Bot., 1, 101, 103, Balfour, Cyclop.

of the sub-
3,000 feet.
it is also
was intro-
ducing

at Bombay for the roots, which are pickled (F. Graham) (Drury).
Lisboa says that the pickled root is much used by the Gujaratis.

COLLOCALIA.

It would appear that there are two or three species of Swiftlet which form edible nests. Dr. Jerdon is of opinion that the best nests are obtained from

Edible Birds' Nests.

COLLOCALIA
nidifica.

synonym of these species, and has, therefore, thrown the economic facts procurable under the names below, which are commonly given to the "Edible Bird's Nests."

Collocalia nidifica, Gray; CYPSELIDÆ.

C. linchi, Horsfield.

THE EDIBLE BIRD'S NEST, SALANGANE, *Eng*; NIDS DE TUNQUIN, *Fr.*, INDIANISCHE-VOGEL-NESTER, *Germ.*; NIDI-DI-TUNCHINO, *It*, NIDOS DE LA CHINA, *Sp.*

Sometimes called Edible Swallows' Nests, the bird is more properly a Swift than a Swallow

When the bird is in the nest, it is called a "Bird's Nest" and when it is out, it is called a "Swift."

BUTTON, 201

When the bird is in the nest, it is called a "Bird's Nest" and when it is out, it is called a "Swift."

FOOD

1722

ANDAMAN
ISLANDS.

1723

small bracket attached to the side or roof of the cave, of a semi circular form, with a radius of about $1\frac{1}{2}$ inches, and regarding the matter of

approach John Lawrence Island, east coast, opposite East Island. The cave is hidden by a mangrove swamp. Strait Island, South Point, one cave. South Button Island, several caves, yielding the best quality of nests. About three miles inland, at the north end of Stewart's Sound, large caves are to be found in a hill, from which the greatest quantity of our nests are obtained." "In Borneo, from which country China obtains the majority of her birds' nests, the better qualities of nests are found in caves in the interior in crystalline limestone rock, only an inferior quality of nests being found on the seashore. These remarks apply equally to the Andamans, and I have no doubt that when the interior of the islands

C. 1723

COLLOCALIA

nidifica.

Edible Birds' Nests.

is explored, many more nest-yielding caves will be found. At our present knowledge is derived from the Malays, who, through fear of the Andamans, did not dare to search the interior. The explorations should be confined to hill country, where the crystalline limestone formation predominates."

NICOBAR
ISLANDS
1724

NICOBAR ISLANDS.—Mr. de Rapstorf, in his official report of the Nicobar Edible Birds' Nests, remarks: "The best nests I found at Katchall. They were entirely snow-white, and of the best quality. The next best quality I have got were from the Island of Bombora. This island I have not personally visited," but he adds, the nests from it "are quite free from foreign matter, and have not the same snow-white beautiful colour as the ones from Katchall. The nests from Katchall are round and egg-shaped, while those from Bombora are long, like the shape of an orange."

"The third quality I have is from Samboing. This is a little empty, but intermixed with little weeds or grass-like stalks. These nests are of good quality, but need cleaning to separate the stalks. The fourth quality I got from the Car Nicobar from a cave in 'David's Bay' in de Rapstorf's time is the worst end of this island. These nests were entirely worthless for purposes of trade, consisting of the little weeds which are mentioned in the nests from Samboing. These nests are, however, fastened together by exactly the same glutinous matter which forms the nests first mentioned."

"The island of Katchall is mostly formed of coral, limestone, and sandstone in all different stages, old, flinty, and yet forming. The island has gone through a series of volcanic revolutions and convulsions, and presents a very pretty landscape, many reefs and sandbars, ravines and craters extending right under the earth. In these craters dwell the bats and the little owls. The light of the sun never shines there. The ground is soft to tread on. If you lift it up and inspect it under the twilight it is seen to contain the wings of the insects, that have fallen a prey to the bats, glimmering like a to remind time rain; the soil is mossy, spread in a hole, and you see the little long-petalled extremities of the revolved together with the feathers fallen from the roosting birds. This is the ground. The swallowers' nests are not easy seen, but if you lift the rock up to the surface and be the side of the cliff and be transparent rainbows while like these, the black head of the little mother appears out of her white hole nest."

ESTER
1725

IN BRAGA.—Mason says of *C. fucifraga* (*C. fucifraga*): "This particular species occurs abundantly on parts of the coast of the Malayan Peninsula in the Nicobar Islands and the Virgin Archipelago, and so high as on certain rocky isles off the southern portion of the coast of America, where the nests are annually gathered, and exported to China. From all this range of coast we have seen no other species than *fucifraga*, nor does it appear that any other has been observed; and I have examined a number both of the adults and of the young taken from the nests, collected in the Nicobars and preserved in spirits, all of which were of the same species. Still, what appears to be *C. nidifica* inhabits the mountains like in the interior of India, though hitherto unobserved upon the coast; and it is worthy of notice that *C. fucifraga* does not appear to have been hitherto remarked inland in this country." (See note quoted by Mason.)

"It may be here added that *C. fucifraga* is commonly seen inland in these provinces. The Karens in the valley of the Tenasserim in the latitude of Tavoy are well acquainted with the bird, and they say it crosses the mountains to and from the interior every year. That it is the same species there can be no doubt, for the Karen name of the bird is 'the white swallow,' from its white belly."

C. 1725

Edible Birds' Nests.

COLLOCALIA
nifida.

In the Burma Gazetteer a list of the birds found in the province is given, and among these are included three species of Collocalia, *vis*, C. *innominata*, Hume, C. *spodiopygia*, Peale, and C. *linchi*, Horsf.

MALABAR COAST—Very little of a definite nature can be learned regarding the edible swallows' nests collected on the western coast. They are said to be found in Bangalore, North Kanara, and so on.

MALABAR
COAST
1726

COLLECTION,
1727

tend that they were made of a sea weed which the bird collected for the purpose and chemically changed in some mysterious way. *Ure (Arts, Manufactures, and Mines)* says "The nests are made of a particular species of sea weed which the bird macerates and bruises before it employs the material in layers so as to form the whitish gelatinous cup-shaped nests so much prized as restoratives and delicacies by the Chinese." On the other hand, many recent writers discredit this theory and believe that the gelatinous material is either the natural saliva of the bird or a substance brought up from the stomach for the purpose and derived from the natural food of the swift, *vis*, insects. In support of this opinion they point out that the better qualities of the nests are found in caves far removed from the sea. Some of the nesting caves of Borneo are 140 miles from the sea. Mr deRoepstorff points out that there are no edible nests in the Nicobar settlement, but a few miles off in a richer tract of country where insect life abounds they are plentiful. "It is thus," he says, "in places

fresh, but when old brownish
Mr Portman remarks "The
this matter, which resembles isin-
cus) resembling Carrageen, an
a weed, but have never seen the
Another theory is that the bird

excretes this matter from his own throat during the breeding season"

takes about a month and the
so, the collectors should wait
go out again, taking care to
observe exactly the same order in their rounds. The nests may be col-

C. 1727

COLLOCALIA
nidifica.

Edible Birds' Nests

COLLECTION

lected until the commencement of the rains, when the collection should cease, and the birds be left to breed. Although the great demand is for the white nests, still it may be remarked that the *fucus* attachments of the grass nests, and the old nests gathered in the November cleaning, may be sold locally at Rs per seer, and should, therefore, be collected. Each collection averages about 52lb of nests." He then proceeds to state

and
and
and
with
hem

carefully in their bag, from which, at the end of the work, they are transferred to a box provided with a lock.

"The greatest care is necessary in detaching the nests from the caves, that they should not be broken or soiled. After being brought into the

Cooking
Nests,
1728

to pieces and cleaned. After this they are boiled in clear chicken-broth until dissolved, a process occupying about two hours longer. The usual allowance is one nest (value Rs1) to a teacupful of soup. Any clear soup

TRADE.
1729

who reside in Rangoon. They recognise three classes:—

'No 1, large, pure, white nests, averaging from Rs110—115 per viss=

3¹/₂lb,
No 2, clean, but slightly coloured nests averaging from Rs100—140

a viss

do not use the nests but they prepare from a sea-weed an artificial nest called *Dschin-schan*, which they export to China. Of the Ratnagiri district it is stated the right to collect nests is farmed out to Goanese, and fetches about Rs28½ a year. The Andaman contractor used to pay Rs3,000, but last year, owing to the contractor having thrown up his contract, the Government worked the nesting and realized Rs4,900.

GUANO.
1730

GUANO IN THE SWALLOW CAVES

An inquiry was instituted into this subject, and Mr deRoepstorff

I am certain that
least one lakh of
rupees per annum. His opinion was expressed regarding the Nicobar islands only, so that if to this be added the possible supply from the Andaman Islands, there would appear to be no reason why India might

Kachá or Taro

COLOCASIA
antiquorum.

not at least meet all its own demands for guano manure if not open up
an export trade in the article.

Collodion, see under *Gossypium*

COLOCASIA, *Schott, Gen Pl, III, 974*

1731

[*Wight, Ic, t 786, AROIDEÆ*

Colocasia antiquorum, Schott, DC, Mono Phanerog, II, 491,

TARO, EDDOFS, SCRATCH COCO, EGYPTIAN ARUM, COCO, KOPEH
Sometimes but incorrectly called YAM

Syn — ARUM COLOCASIA *Willd, Roeb, Fl Ind, Ed C B C, 624*

Vc " " " "

1732

207

Habitat — Wild over the greater part of tropical India, and also cultivated throughout India on account of its corms, which are used as an
It is grown at places

COLOCASIA
antiquorum.

The Kachu or Taro.

floras of the South of Asia, we cannot doubt that this plant is wild in India, as Roxburgh formerly, and Wight and others have more recently asserted likewise in Ceylon, Sumatra, and several islands of the Malay Archipelago."

Engler (in *DC, Mono Phanerogm, vol II*) describes some seven varieties of this plant, three of which are apparently met with in India —

α typica, Wright, *l.c.*, t 786. *Arum colocasia*, Roxb *Fl Ind*, Ed

f. *r.* cultivated form

2. *nymphaeifolia* (Aram nymphaeifolium, Roxb., Fl. Ind., EJ, C.B.C.,
As. Bot. t. 1, p. 286. Pl. Ind. t. 1, v. 1, p. 1. Th. 1, p. 1. The Cor. is white of

larger than any of the varieties of *Colocasia* "var. *typica* above), "yet the leaves are narrow in proportion to their breadth". The only good character by which to know this form "is the shortness of the club of the spadix." "Every part of this plant is eaten by the Hindus."

A good deal has been written regarding the cultivated species of *Colocasia*, but it has been found impossible to discover what species, still less which varieties are alluded to. On this account it has been deemed desirable to compile the economic information here given from such authors as could be depended on for the accuracy of their general information, and to thus leave for future research a more detailed description than will be found here.

The following facts seem to refer to *var. typica*

The following facts seem to refer to *var typica*
Medicine — The pressed juice of the petioles is styptic, and may be used to arrest arterial hæmorrhage. Dr Bholanath Bose reports very highly in favour of this property, and states that the wound heals by first intention after its application (*Pharm. Ind.*) It is sometimes used in emache and otorrhœa, and also as an external stimulant and rubefacient by the natives.

Special Opinions.—“The juice expressed from the leaf stalks of the
of named glands
of alo-
es and
wasps
e seen
o fresh
than a

 α fact=MEDICINE
1733FOOD
I734

C. 1734

The Bish Kachá.

COLOCASIA
virosa.

spinach, but, like the root, they require to be well cooked in order to destroy the acidity peculiar to Aroids. A considerable number of

FOOD

carrot-shaped, often weighing several pounds, and forms an important article of food among the lower classes, where quantity and not quality is a desideratum. It is usually served fried in *ghi* or boiled and pounded into a paste, and also in curries. There are varieties that are very small, hardly weighing more than a quarter of a pound. In the Manual of Coimbatore it is stated that the corms (apparently of *var. nymphæifolia*) often weigh as much as 70 to 80 lb each, and that an acre will yield 250 maunds (of 2½ lb), worth 12 annas a maund. The tubers are used by the natives of Bombay in curries, &c. They form the common food of the inhabitants of Travancore. The Malays hold it in high estimation (*Balfour*).

§ "Is considered very nutritious by the natives, who use it in their curries" (*Honorary Surgeon P. Kinsley, Chicacole, Madras*).

Colocasia cucullata, Schott

1735

Syn. for *ALOCASIA CUCULLATA*, Schott

C. indica, Engl., DC, *Mono Phanerog*, II, 494.

1736

Syn. for *ALOCASIA INDICA*, Schott, which see, A. 809

This plant is said to be specially cultivated in Brazil for its esculent stems and small pendulous tubers. It is known as *Man saru* in Orissa, and is there used in the treatment of piles.

C. macrorrhiza, Schott

1737

Syn. for *ALOCASIA MACRORRHIZA*, Schott

A species met with in the Eastern Provinces and Sikkim, and also in the

kappé Ainslie (*Nat. Ind.*, II, 463) gives its Chinese name as *dea-view*

and the name of the

krit

poes

prac

rubbed on the head, sometimes cures intermittent fevers after every other remedy has failed. The active principle is very volatile, so much so that by the application of heat or by simple drying, the roots become innocuous.

C. virosa, Kunth, DC *Mono Phanerog*, II, 495, Roxb., *Fl. Ind.*, Ed. C.B.C., 632 (under *calla*)

1738

Vern.—Bish Kachá

This plant, which is a native of the Lower Provinces, is the only member of the genus which the natives of India regard as poisonous. It is sometimes used medicinally, but is never eaten.

C. 1738

COLOCASIA
VIROSA,

Poisonous Properties of Aroids

CHEMISTRY
1739

Chemistry—Through the kindness of Messrs Pedler and Warden (*Professors of Chemistry in the Calcutta University*), the writer has had the pleasure to receive an advance copy of their paper* on the chemical properties and medicinal uses of the species which, by the early botanists, were all treated as belonging been thrown into some half a paper was to investigate the and the enquiry was suggested on receiving from the Civil Surgeon Dibrugarh "some portions of raw *Bish Kachu* tubers and leaves with the following statement "A cooly woman administered some of the fried *kachu* to another sick cooly on the same garden, but the man, experiencing a burning sensation in his mouth, instantly spat it out. A pig ate what was so thrown away and died in an hour. A second pig was experimented on with some of the same stuff, and fatal results also supervened. During the course of the same year a second case of poisoning by *kachu* was referred to the Chemical Examiner's Department, in this case slices of *kachu* tubers were introduced into a jar containing 'goor'. The

writers on economic botany say that the *bish kachu* is *Colocasia virosa*, and accepting this to have been, in all probability, the plant Pedler and

holic extract was prepared and found to have no poisonous effect. The same result followed on the administration of a distillate which was found to have no acid taste, and, as with many other vegetable substances distilled with water, it was found to contain a trace of hydrocyanic acid. "It is possible, however that certain varieties of *ARUM* may contain a larger amount of prussic acid, as, for example, the *A. segalum* of the West Indies, which is stated to furnish a juice, two drachms of which has proved fatal in a few hours. The tubers left in the retort after distillation with water were still physiologically active, indicating that the active principle was not dissipated by mere boiling with water. Natives, in using *ARUM* for culinary purposes, frequently add an acid vegetable or fruit such as tamarind. We tried the action of certain acids on the fresh tubers and ascertained that boiling with water acidulated with hydrochloric acid when a fragment ted in a similar l, was very much ue any decided id cated the presence of a large amount of potassium and magnesium, calcium was also present, but we ruled to obtain indications of sodium. The acids consisted of carbonic, phosphoric, hydrochloric, with traces of sulphuric acid. We also obtained from the dried tubers very marked quantities of potassic nitrate, so that when they had been incinerated they behaved very like

*See *Journal of the Asiatic Soc. Beng.*, LVII, Pt. II, No. 1 for 1885.

Poisonous Properties of Aroids.

COLOCASIA
VIROSA.

tuber, containing saltpetre. The examination of the ash thus failed to afford us any clue to the physiological action of the fresh tubers."

"It now occurred to us that possibly the painful effects produced by ARUM when in contact with the tongue, &c., might be due to mechanical

CHEMISTRY.

in cold diluted nitric or hydrochloric acid. There appears to us to be no reason to doubt the fact, that the whole of the physiological symptoms caused by ARUMS are due to these needle-shaped crystals of oxalate of lime, and that the symptoms are thus due to purely mechanical causes.

crystals on microscopic examination of dried ARUMS as we had found in the fresh tubers. We explain this apparent anomaly in the following simple manner. In the fresh condition of the tubers, the bundles of crystals of oxalate of lime are so packed together, that, in the drying of the tubers, the sharp points covering a more or less parallel to one another a smaller area. And thus, instead of each crystal acting as a separate source of irritation and penetrating the tissues, the bundles act as a whole."

The poisonous effects of certain aroid tubers are therefore the result of mechanical irritation, similar to that produced by cowage (*Mucuna pruriens*) or to chopped hairs criminally mixed with food. It would be interesting to have this line of enquiry carried to its final issue in a systematic examination of all the plants, like rhubarb, which contain raphides. It is just possible that the crystals of oxalate of lime may

chemically analysed, but it may be said we have not advanced much nearer a full understanding of the chemistry of rhubarb connected with its physiological action than we were before. It is thus probable that the results of Pedler and Warden's analysis of the aroid tubers may have a more extended influence on therapeutic science than they seem to have realized.

Colocynth, see *Citrullus Colocynthis*, Schrad.; CUCURBITACEÆ.

Colombo (or Calumba) Root, see *Jatrorhiza Calumba*.

Bladder Senna

[103, LEGUMINOSÆ]

Colutea arborescens, Linn., var *nepalensis*, Fl Br Ind, II,

Syn —C NEPALENSIS, Sims, *Bot Mag*, t 2622

Vern—*Bras* LADAK, AFGHANISTAN

References — Brandis F
Pb Pl, 64 O Shaug
Pharmacog, 221, U
and Drugs, Sind, 13
of Botany

Habitat — A shrub of the temperate west Himalaya, Kunawar, Tibet,

MEDICINE
Leaves

I74I

irgative, and are used to
Europe as a substitute for
tion. They are admin s

tered in infusion or decoction in the dose of about half a pint (*U. S. Dispens., 1617*)

Colza Oil, see *Brassica campestris*, Linn var *Napus*, B No 810

COMBRETUM, Linn, Gen Pl I, 688

[COMRETACEE

Combretum decandrum, Roxb, Fl Br Ind, II, 452.

Vern.—*Dhobela* CHINDWARA, *Punk* GONDA, OUDH, *Arikota* TEL,
Kalyara, NEPAL, *Pindik* LEPCHA

References—*Roxb Fl Ind Ed C B C*, Brandis *For Fl*, 111,
Gaible, *List of Darjeeling Climbers &c*

Habitat.—Abundant in Bengal at altitudes up to 3000 feet. Very common in the North Deccan plateau in the North Western Provinces, Tenasserim and the Andamans.

Is said to be used medicinally, but very little is known regarding the uses of the plant. The Santals, who call it *atena*, make baskets from its long thin stems (Campbell)

1743

1744

C. nanum, Ham , Fl Br Ind , II, 457

Vern — *Dant jálthi pharsia* N W P and Pa

References ~Brandis For Fl, 221, Baden Powell Pb Pr 350, Reyle,
Ill Hist Bot, I, 209

Habitat.—A decumbent, low shrub of the Himálayan terai, from Sikkim to the Panjáb

Sikkim to the Panjáb
Medicine—Mr. Baden Powell mentions this plant among his medicinal plants of the Panjáb

MEDICINE
I745

1746

C. ovalifolium, *Roxb*

Vern.—*Bandi kattu tige yādala chettu, bandi kōta*, TEL. (the buffalo-calf tree)

A common climber throughout the Deccan Peninsula, probably eaten by buffalos

C. 1746

The Spider-words

COMMELINA
communis.

COMBS, fans, brush-backs, and other smaller articles—Woods used for —

Adina cordifolia (combs)
Alangium Lamarckii (cattle-bells)
Albizia stipulata (cattle bells)
Artocarpus integrifolia (brush-backs)
Bauhinia Vahlii (umbrellas, rain-caps)
Buxus sempervirens (instruments, combs, small boxes).
Carissa diffusa (combs)
Casuarina tomentosa (combs)
Chloroxylon Swietenia (picture-frames, brush backs),
Cordia allamanda (combs)

Cratæva religiosa (combs)
Elæodendron glaucum (combs, picture-frames)
Gardema costata (combs)
G. latifolia (combs)
G. lucida (combs)
Gmelina ardorea (picture frames)
Olea ferruginea (combs)
Platanus orientalis (pen cases)
Psidium Guaya (instruments)
Pyrus Pashia (combs, tobacco-pipes)
Schrebera swietenoides (combs and weavers' beams)
Stephegyne parvifolia (combs)
Sterculia urens (guitars)

WOODS FOR
COMBS, &c.
1747

COMMELINA, Linn, Gen Pl, III, 847.

1747

The genus of the Spider words is named in honour of the Dutch botanist Commelin.
Commelina benghalensis, Linn, DC, Mono, 159, Clarke,
Comm et Cyrt, 14 Pl IV; Wright, Ic, t 2065, COMMELINACEÆ

1748

Vern — *Kanchura*, HIND *Kanchura kanuraka*, *kanchura*, *kashradm*, *kanchara*, BENG, *Kat a arak*, SANTAL, *Chura*, *kanna*, PB, *Khanna*, SIND *Kanchata* SANS, *Deya mauwaireya* or *deya mendriya*, SIND, *Ho tan tu*, CHINESE

References — Roxb, Fl Ind, Ed C B C, 57; Voigt, Hort Sub Cal, 676, Thwaites, En Ceylon Pl, 321, Dals & Gibs, Bomb Fl, 253, Stewart Pb Pl, 236, Atchison Cat Pb and Sind Pl, 148, Trimen Syst Cat, 95, DeCandolle, Mono Phanerogam, III, 159, Rev A Campbell, Descript Cat of the Pl Chutia Nagpur, V C Dutt, Mat Med Hind, 303, Murray Pl and Drugs, Sind, 22

Habitat — in the pennis Deccan Dal Bombay. Distributed to Burma, Malay, and China. It also occurs large, and the everywhere in

Food — LEAVES eaten by the poor people as a pot-herb, especially in times of scarcity. The fleshy rhizomes of some of the species of this genus contain much starch, mixed with mucilage, and are therefore wholesome food when cooled. Balfour says *C polygama* (a name which would appear to be a synonym for *C benghalensis*) is cultivated in China as a pot herb eaten in spring. "The juice of the flower is used as a bluish pigment in painting upon transparencies" (Smith).

FOOD
Leaves
1749
Starch
1750
Pigment.
1751

C. communis, Linn, DC, Mono Phanerogam, III, 170.

1752

Vern — *Kena* BOMB, *Wek kys* BURM Stewart says that this, as also *C. benghalensis* are in the Panjab known as *Chura kanna*. Balfour gives the following names *Kanang kiras*, *Annun kaiti pillu*, TAM, *Venna deya kura niru kassu*, *venna mudra*, *venna vedara*, TEL, *Vatsa priam*, SANS

It may be here recorded of the vernacular names given to this and, in fact, to all the species of *Commelina* that they require to be verified and assorted under the modern scientific names for the species of this genus.

COMMELINA
suffruticosa
The Spider worts

References — *Voigt, Hart Sub Cal 677 Dals & Gibs, Bomb Fl 2512*
Stewart Pb Pl 236, Aitchison Cat Pb and Sind Pl, 148, Balfour's
Cyclopædia of India

Habitat — A native of the hot damp regions of China and Japan.
 From Chittagong, plants are said to have been sent to the Botan

present been left in the present position

FOOD
 Seeds,
 1753
 Leaves
 1754

Food. (These are common at ... were largely

calves when they wish to wean them from their milk. The leaves are
 eaten by the natives mixed with other greens"

[Com and Cirt Table I

1755

Commelina nudiflora, Linn, DC *Mono*, III, 144, C B Clarke's

Syn — *C. CAESPITOSA* Roxb, *Fl Ind*, Ed C B C, 58 *C. NUDIFLORA*,
 Linn, as described in *Roxb Fl Ind* Ed C B C is *ANEILEMA KUDI*
 FLORUM, Linn, the *Kundali* of Bengal

Habitat — Frequent in Bengal, and distributed to Burma, Ceylon and
 the Malay, also to Africa, Madagascar, Mauritius, Sandwich Islands, and
 Australia, &c

Compare this with the remarks under *C. communis*, Linn., and
C. obliqua, Ham

1756

C. obliqua, Ham., Clarke, p 19 pl IX

Syn — *C. COMMUNIS* Roxb, *Fl Ind*, Ed C B C, 57

Vern. — *Kanjur kâna HINO Jata kanchura, jata kanchira BENO*,
Korna kâna BIJNOR, Kanjura KUMAON

Habitat. — This species is common over the low moist parts of Ind
 in Bengal, Coromandel and Bombay Distributed to Burma
 str buted to

MEDICINE

Root

1757

FOOD

Root

1758

1759

C. salicifolia, Roxb, *Fl Ind*, Ed C B C, p 58

Vern. — *Yalop ppals languli, SANS, Pami kanchira, BENG*; *Yalp pari*,
HIND; *Bir kana arak*, SANTAL

References — *DeCandolle, Mono Phanerog*, III, 157; *U C Dutt Mat*
Med Hind, 300

Habitat — Common in wet places in the peninsula of India, especially
 in Bengal, Coromandel and Bombay Distributed to Burma

Fodder — Cattle are said to be fond of this plant

FODDER

1760

1761

C. scapiflora, Roxb, see *Anellema scapiflorum*, Wight A 1122

C. suffruticosa, Bl, DC, *Mono Phanerog*, III, 189

Vern. — *Dare orsa* SANTAL

Habitat — A native of Bengal

Medicine — The root is by the Santals applied to sores (Campbell)

MEDICINE

Root

1762

C 1762

Spotted Fern. *Conurus*

CONNAPUS
MONOCARPUS

Conch Shell, a species of *Turbonella*, see Shells, and Beads 2. 381.

Condiments, see Spices

Conessi Bark, see *Holarrhena antidysenterica*, Wall., APOKAKTE.

CONGEA, *Roxb.*, *Gen Pl.*, II, 1159

Congea tomentosa, *Roxb.*, *Fl Br Ind.*, IV, 603, *Wight, Ic.*, 1763

Vern — *Tamarkanu kajan* BURM

References — *Kurz For Fl Burm.*, II 256 *Roscoe in Forb Fl Ind.*, Ed C B C, 47

Habitat — A large climber in Chittagong and Burma, described in Siam Roxburgh says it is found also in Coromandel where it flowers in the cold season the Chittagong plant flowering in March The *Flora of British India* describes a variety — *Azurea* — as cultivated in North India All the species of this elegant genus are characterised by their purple bracts

C. villosa, *Wight, Ic.*, t 1479, fig B, *Fl Br Ind.*, IV, 603 1764

A large climber of Pegu and Mergui, the leaves of which are used medicinally (*Mason, O'Shaughnessy, &c*)

CONIUM, *Linn.*, *Gen Pl.*, I, 883

Conium maculatum, *Linn.*, *DC, Prodr.*, IV 242, UNBELLIFERÆ 1765

SPOTTED HENLOCK, HENLOCK, *Eng.*, CIGUË, *Fr.*, SCHIERLINGS, *Germ.*

Vern — *Shomkran*, ARAB, *Kirdamāna*, BOMB

References — *Pharm Ind.* 104 *Ainslie, Mat Ind.*, Preface p XII, *O'Shaughnessy Beng Dispens.* 269 *Dymock Mat Med W Ind.*, 2nd Ed 363 *Fluck & Haub Plirmacop.*, 299, 301 *U S Dispens.*, 15th Ed 194 484 *Bent & Trim, Mat Pl.*, 118

Habitat — Met with in Europe and temperate Asia, common in England

Medicine — Although this drug is commonly used in Indian pharmacy, and largely imported no effort seems to have been made to cultivate the plant in the East MEDICINE. 1766

CONNARUS, *Linn.*, *Gen Pl.*, I, 432, 1001

1767

1768

C. 1768

CONVOLVULUS
arvensis
Connarus, Deer's foot Bind weed.

References.—*Belhorne, Fl Syls App LXXXI* Wight and Arn^o, *Prod Fl Pen Ind Or*, 143, *Thun, En Cey Pl*, 83, *Kurz, For Report*, Bomb G^o, XIV., 330, *Dal's and G^o's, Bomb Fl*, 53, *Rheede, Mal*, II, t 24

Habitat.—A small tree or shrub of the Western Peninsula, from the Concan to Travancore, common on the Southern Ghats, very abundant in Ceylon. Flowers yellow, fruit long, bright red, the tree becoming very ornamental when in fruit

Oil.—The seeds yield an Oil.

Structure of the Wood.—The timber of this, as of most other species of the genus, is much valued for ornamental purposes.

L
1700
TIMBER
1770
1771

Connarus nitidus, Roxb, in Hort Beng, 49

References.—*Leg^o, Hort Sub Cal* 1st 5 Gamble, *Man Timb*, 114

Habitat.—Said to be found in Sylhet and British Burma.

Oil.—Dr McLelland says that in Rangoon the seeds of this plant yield a quantity of sweet oil. The name *C. nitidus* is not referred to by the *Flora of British India*, but it may be presumed that the plant which yields the oil in question is *C. paniculatus*

OIL
1772

1773 C paniculatus, Roxb, Fl Ind, Ed C B C., 505, Fl Br Ind, II., 52.

References.—*Kurz, For Fl Burm*, I, 3rd, Gamble, *Man Timb*, 114
Wick^o, Ill., t 64

Habitat.—Roxburgh, followed by Voigt and Kurz, describes this as "a large timber tree," but Hooker in the *Flora of British India* says it is "a large climber" met with in Sylhet and the Khasia hills, to Chittagong

1774

C speciosus, McLell

Vern.—*Guvioak & dan-dakel*, BURM

Habitat.—Said to be a large tree of Rangoon, Pegu, and Tenasserim.

Oil.—McLelland says that the seeds yield an abundance of sweet oil.

The above has been extracted from Dr Cooke's *Report on Oil Seeds*. The name *C speciosus* McLell was taken apparently from *Balfour's Cyclophelia*. It seems probable that the tree here alluded to is *C. gibbosus* Wall.—a large tree met with near Rangoon and in Tenasserim, Penang and Singapore. The Burmese name *Gwe* (*Spondias mangifera*) seems very near to the above

OIL
1775

Structure of the Wood.—Balfour says of *C. speciosus* "It has a large, heavy, and strong timber, white coloured, adapted to every purpose of house-building"

TIMBER.
1776

**Conocarpus acuminata, Roxb, see Anogeissus acuminata, III.,
CONCRETACEA A. 1145**
C. latifolia, Roxb, see Anogeissus latifolia, III., A. 1149

Construction and Railway purposes.—Timbers suitable for,
see Cart and Carriage Building, C. 632.

CONVOLVULUS, Linn, Gen Pl., II., 874

1777

Convolvulus arvensis, Linn, Fl Br. Ind, IV., 219 CONVOLVULACEA.

DEER'S FOOT BIND-WEED

Syn.—*C MALCOLMI, Roxb, Fl Ind, Ed C B C., 109.*

C. 1777

Scammony

CONVOLVULUS
Scammonia.

Vern — *Veri* (?) *harin-padi*, or by some writers *hiran paddi*, Pb, HIND, *Hirn-pug*, SIND

References — *Voirg*, *Hort Sub Cal*, 362, *Dals & Gibs*, *Bomb Fl* 163 *Stewart*, Pb Pl, 150 *Atchison Cat Pb* and *Sind Pl*, 98, *O'Shaughnessy*, *Beng Dispens* 502, *Murray*, Pl and *Drugs*, *Sind*, 164, *Year Book Pharm*, 1879, 467, *Medical Top of Ajmir*, 150, *Baden Powell Pb Pr*, 367

Habitat — An abundant weed of cultivation all over the plains of the Panjab and Western India, from Kashmir to the Deccan, ascending to 10 000 feet in the Himalaya. Flowers large, deep rose coloured, sweetly scented they appear in the cold season, very common on the black soil of Gujarat and the Deccan

Medicine — The officinal *hiran paddi* (or *harin padi*) appears to be this plant. The roots possess cathartic properties. Murray says the roots are sometimes used by the Sindis as jalap

Fodder — *Veri* is a dark green weed usually found in wheat fields. It is said to be greedily eaten by goats and cattle, and is gathered by village children as a fodder

MEDICINE.
Root
1778
FODDER
1779

Convolvulus Batatas, Linn, see *Ipomœa Batatas*, Lamk

C. parviflorus, Vahl, *Fl Br Ind*, IV, 220

Vern — *Alaranyi*, TEL

A native of Assam, the Deccan Peninsula, and Ceylon, but largely cultivated throughout India

1780

C. pentaphylla, Linn, see *Ipomœa pentaphylla*, Jacq.

C. pluricaulis, Choisy, *Fl Br Ind*, IV, 218

Vern — *Porprang*, *gorakh panw*, *baphalli dodak* Pb

References — *Stewart*, Pb Pl, 150, *Atchison*, Cat Pb and *Sind Pl*, 99

Habitat — A common plant in many places throughout the plains of Panjab, Hindustan, and Behar

Food and Fodder — "It is eaten by cattle and is reckoned cooling, and used as a vegetable or given in sherbet" (*Stewart*).

1781

FOOD and
FODDER.
1782

C. reptans, Linn; see *Ipomœa aquatica*, Forsk.

C. Scammonia, Linn, *DC. Prodr*, IX, 412.

SCAMMONY

Vern — *Mahmudak* (?) *sakmunia*, Pb, *Sugmonia*, *sak mânia*, HIND, SIND, ARAB, PERS

References — *Kurz*, *For Fl Burm*, II, 212, *DC Origin Cult Pharm Ind*, 153 *O'Shaughnessy*, *Beng Dispens*, 500, *Dymock*, *Mat Med*, *Res*, *pens*, *Drugs*, 151,

Irvine and New India, 114.

Habitat — A climbing perennial, native of Syria, Asia Minor, and Greece. Cultivated in some parts of India

Gum resin — A gum resin imported into India. It is obtained by incision from the living root. It occurs in irregular pieces of an ash grey colour and rough exterior. When broken, it presents a resinous surface, and of a shining black colour when dry. Thin pieces are translucent and

GUM-RESIN.
1784

C. 1784

Coptis or Mishmi Teeta.

COPTIS
Teeta.

Copra or Khopra—The dried kernels of the cocoa-nut, see *Cocos nucifera*.

COPTIS, *Salisb.*; *Gen Pl*, I, 8, 953

1788

The name COPTIS has been given in allusion to the much cut leaves of the plants which have been referred to this genus

Coptis Teeta, *Wall*, *Fl Br Ind*, I, 23, *RANUNCULACEÆ*

1789

COPTIS or GOLD THREAD, COPTIDIS RADIX, or MISHMI TITA

VERN—*Tita*, ASS., *Mamira*, or *Mamiran* (ДЫМОК) HIND, *Mahmira*, SIND, *Pita karasana* SING Rice says that *tita* is a corruption of *tikta*, SANS, "bitter"

References—*Voigt*, *Hort Sub Cal*, 3 *MacIsaac*, *Trans Med and*

Habitat—A small, stemless herb, with perennial root stock, met with in the temperate regions of the Mishmi Hills, east of Assam Cooper says that the plants grow on the ground among the moss around the stems of trees "From each root," he remarks, "springs a single stem, about four inches high, bearing three serrated leaves, attached to the head of the

to suggest that
early European
on the fact that

HISTORY.
1790

mahmira is the name of a drug used in Sind in the treatment of eye diseases, a purpose identical with that for which the *Maupás* was em

rium clears the sight, and as a snuff the brain, and that it relieves tooth-ache Internally it is given in jaundice, flatulence, and visceral obstructions' (*Mat Med West. Ind*, 2nd Ed, 18)

Dymock further remarks that two kinds of the drug are at the present day met with in Bombay The best quality is only about the thickness of a crow-quill or a little thicker, it is a yellowish rhizome, hav-

1791

C. 1791

COPTIS
Teeta.

Coptis or Mishmi Teeta

HISTORY

0000

branches at the crown into two or three heads, which terminate in tufts of leaf-stalks crowded together, and not separate as in the first kind. Both of these rhizomes are contorted, and have a short fracture, the centre is spongy, and the surrounding portion bright yellow and woody, taste purely bitter. "The first kind corresponds with the description of Coptis root in the *Bengal Dispensatory*. The second kind with the description of that drug in the *Pharmacographia*." While accepting this opinion it may be here stated that considerable confusion still exists in the European literature of the subject.

It is an interesting feature in the history of this drug that it continues to be imported from China, even although the Bengal supply reaches India through Assam. Indeed, it may be doubted how far the Chinese imports correspond to the roots of Coptis Teeta. It is customary to read that the Chinese *chuen-luen*, and probably also the *mu-lien*, are Coptis

whether that plant is wild or abundant information exists of the hills that separate, therefore, be safely asserted that we do not know the plant which yields the Chinese drug. In Japan Coptis *anemonefolia* affords a medicinal root, and it is, therefore, just possible that a portion of the Chinese drug may be obtained from one of the plants of the genus Coptis.

1792

phragmites? Dr. Dymock's account of the imported Chinese thicker form of the *mamira* of Bombay recalls, however, some of the forms of a drug sold in Bengal under the name of *Kitka* or *kurá* (*Katuka*, Sans.)—a drug now generally recognised as obtained from *Pterorhiza Kurroa*. Dr. Dymock thinks there is but one root sold in India under the name of *kurá*, but in connection with the Calcutta International, and again with the Calcutta International.

1793

He is, usually, out of the free-

stated if even the plant exists in any part of the Chinese empire. The true *tita* sold in Upper and Western India may thus be *mishmi tita* that may have found its way by re-exportation into the returns of the Chinese

Coptis or Mishmi Teeta.	COPTIS Teeta.
drugs imported into India, or may have been conveyed overland from the Indo-Chinese frontier to Chinese ports. Hence, as far as our present in-	HISTORY.

1794

sulting
almost
original
Pereira

may have been mistaken in referring the *Maupás* of the ancients to *Coptis Teeta*, since it is this imported Chinese drug that is the *mamíran* of Upper India. Further, it seems even probable that the knotty, yellow, often ramified rhizomes of *Picrorhiza*—according to modern writers the spurious *mamíran* of the Indian bazars—may have been the drug originally so called, or at least been the Indian drug which most closely resembled the

of the wildest of hill tribes. But there is nothing in data to justify the inference that, in ancient times, there may have existed a much larger export

possible, however, that in later times the Chinese supply may have been

ne extent,
iters came
on, in his
year, col-
natives in
a yellow

1795

1796

watery juice, as every plant with a yellow juice seems to be by them considered a sovereign medicine, and all are called indiscriminately *mamíran*. He further states that the roots of *Geraanium Wallichianum* were shown to him as a medicine called "*mam-f-ran*."

It has been pointed out by chemists that both *Coptis* and *Berberis*

alter the same fashion as the *Maupás* of the ancients. But *berberine* is present in a great many other yellow and bitter substances, and it may therefore have been a mere coincidence (suggested by external appearances) that the root now called *mamíran* and the *Maupás* came to be used for the same purpose. Indeed, *Picrorhiza*, on being chemically examined, may also be found to possess that alkaloid, since *berberine* is one of the most frequently met with of all the alkaloids present in vegetable substances. But even should it not possess *berberine*, that could scarcely

1797

C. 1797

COPTIS
Teeta

Coptus or Mishmi Teeta.

HISTORY.

be viewed as militating against its having been adopted as a substitute for a drug for which Coptus would have proved more suitable. At the same time, it is not impossible that the treatment of eye affections is but a Materia Medica. The while the drug Picrorhiza was known to the earliest Sanskrit writers. The late Dr. U. C.

Sanskrit writers, but it seems conclusively established that even the drug Coptus Teeta is but of modern introduction into India. The Muhammadans were so little familiar with Picrorhiza that they frequently confused it with Hellebore, and may thus be readily believed to have given to Picrorhiza or to Coptus, when separately presented to them, the name of *mamiran*—the name of a drug which either or both may possibly have closely resembled. The Hindus are uniformly precise and accurate in their information regarding Picrorhiza, but say nothing of Coptus. The earliest writers on Indian Materia Medica who allude to Coptus attribute to the indigenous and imported Chinese drugs the properties of remedial value in the treatment of nervous diseases and in debility after fever, they rarely make any mention of its use as a collyrium in eye affections. The tonic properties of Coptus are possessed in a scarcely less degree by Picrorhiza, and it may be concluded that Mir Muhammad Hussain's discovery of the value of Coptus as a tonic is a very ancient Greek names given by Muhammadan merchants to Indian drugs, suggests a very

Collection.
1798

As we neared the highest elevation, scattered trees and shrubs seemed to grow from a thick bed of dry moss and here, for the first time, I saw the *Teeta* plant growing abundantly. The roots (from which, when brewed and steeped in hot water, the famous febrifuge is made) are embedded in moss. From each root springs a single stem, about four inches high, bearing three serrated leaves, attached to the head of the stalk like elongated trifol. The Mishmees gather the roots towards the end of the rainy season, and carry them packed in tiny wicker work bamboo baskets to Sadya, where they are eagerly bought by Assamese and Bengali merchants. The Secretary of the Government of Assam has ordered that the quantity of *Teeta* at Sadya is estimated at a maund or a maund and a half. It is brought down in small open bamboo baskets, weighing about 1/2 a chattrak each, and sold at the price of 1/2 a chattrak each, but the small quantity of *Teeta* is out of all retail price which the drug fetches. Dr. Dymock says of the Bombay supply: "Both

Coptis or Mishma Teeta

COPTIS
Teeta.

kinds of the drug come from China *via* Singapore, in bulk. The first is worth Rs 3½ per lb, the second Rs 2. O'Shaughnessy says "Coptis Teeta has found its way through the drug-shops of Bengal, and is even occasionally exposed for sale in the Upper Provinces."

MEDICINE.

MEDICINE.
1799

Therapeutic and Chemical Properties—Coptis trifolia, a creeping

1800

its influence several patients, recovering from acute diseases, manifestly, and very rapidly, improved in strength. The dose was 5 to 10 grs of the powder, or an ounce of the infusion thrice daily." Dr K. L. De, O.E., says "In this indigenous article, though a costly one, we have an adequate substitute for Columba root, which it resembles not only in its medical effects but also in its physical properties. An essence of this drug has been recently brought forward for use by Messrs. Bathgate and Co., of Calcutta."

1801

the Coptis d. the colouring matter in which the rhizome of Coptis

less than 8½ per cent, which is more than has been met with in any other

note
a b

1802

The Barberry.
Columba root
Hydrastis canadensis
Xanthorrhiza apifolia

Xanthoxylon fraxoneum.
Memspermum canadense.
Coscium fenestratum
Coptis trifolia

C. 1802

CORAL.

Teeta: Coral.

MEDICINE

"*Thalictrum foliolosum*, DC, common at Mussooree and throughout the temperate Himalaya at 5,000 to 8,000 feet, as well as on the Khásia hills, also affords a yellow root, which is exported from Kumáon under the

-Coptis
up in
emble
| See
stated
called

CULTIVA-
TION.

1803

mamifan.

CULTIVATION OF TITÁ.—In concluding this brief account of *titá* it may be remarked that little or no difficulty would be experienced in cultivating the plant in many parts of India, but that up to the present date no attempt appears to have been made to do so, although the retail price paid for the drug would apparently justify the suggestion that it would be found a remunerative crop.

1804

CORAL.

1805

1806

Coral

CORAL.

may be described as covered externally by the outer fleshy wall and terminated

1806

or sclerobasic coral. Such a coral can therefore alone be produced in a compound organism. In the sclerodermic coral each polype has a complete skeleton of its own and may hence exist independently or be combined into a colony

1807

as a source of manure

Coral.

1808

CORAIL, *Fr*, KORALLEN, *Germ*, KORAALEN, *Dutch*, CORALLO, *It*, CORAL, *Port & Sp*, KORALLU, *Rus*, CORALLIUM, *Lat*, Κοράλλιον, *GREEK*

Vern — Murjan, *munga* HIND, *Beth : marjan* (fragments of red coral used medicinally), *sang : marjan*, *Ps*, *Gall*, DEC, *Patalam*, *nuraj*, *kai* (foam stone), *TAM*, *Pigulam*, *TEL*, *Yidruma*, *prabala*, *pravala*, *SANS*, *Bisid*, *ARAB*, *Murjan* or *merjan*, *PERS*, *Babelo*, *SING*,

R

CORAL.

Coral.

Habitat.—The Coral zone extends on either side of the Equator for about 1,800 miles. Mr. J. Murray, of the *Challenger* Expedition, has pointed out, however, that within this area the corals abound most on the

coral luxuriates requires to have a surface-water temperature of 70° F., and to never vary from this more than a limit of 12° F. There are a few

fluences that confines the coral regions but fixes each species

in which alone it is found to grow

corals, the ornamental corals occur, and luxuriating, under lower temperatures, they are found in tropical seas at much greater depths than the reef-forming. The latter class of corals grow between 5 and 30 fathoms of water. They are killed by exposure to the sun, and must therefore be below low-water level. On a land subsiding they will accordingly build vertically so as to preserve their favourite depth, and on a land ascending they will extend horizontally, advancing into the requisite depth of water as the older landward and exposed portions are killed by being carried above the level of the water. This was the theory established by Darwin, and universally accepted for a quarter of a century, the atolls being viewed as monuments erected by the Actinozoa to a vast Pacific continent which had gradually sunk beneath the ocean. While this may take place, a new school has advanced the theory that it is by no means essentially necessary that to construct an atoll, the island which it encircles need be subsiding. Growth is attributed to the food materials being most abundant along the face of the reef, the approaching water being richer than that within the lagoon. It is even further explained that the chemical action of the sea on the dead coral, thus excavating the shallow

face of the reef and thus

explain the fact that on

the present face of the reef

which we have no evidence of its having the power to live, or then pit

from a peduncle

it may

vidence

ques

tionably rising, and reefs of various ages are now considerably above the

level of the sea, whereas a few miles seaward from these dead reefs, atolls

are being formed around the islands of the Indian Ocean.

A.—CORAL REEFS.

In the *Map of Corals of India* it is stated that the coral reefs of the Bay of Bengal are for Calcutta. The past twenty years have seen the reefs from the necessity of being raised, and the reefs are a source of

REEFS.
1809

Coral Reefs.	CORAL.
lime, abundant fuel, and labour at command, there can be little doubt that Calcutta might be supplied with excellent lime at a comparatively small cost, and a useful and profitable occupation would be thus afforded for the convicts."	CORAL REEFS Andamans. 1810
In the Nicobar Islands upraised coral reefs are found on the coast of	Nicobar. 1811 Sind, 1812
(dam) across the Habb river, a thin bed composed of corals appears a few feet above the base of the Gaj group. This bed can be traced for many miles to the south. All the species of coral (five or six) are encrusting forms or small branching kinds. A <i>Pachysens</i> , or some closely allied form, and two or three species of <i>Hydnophora</i> , are specially common." So again near Nari he writes of coral beds: "The marly shales pass up into light yellow and brown limestone, with a coral zone abounding in	Bombay. 1813
fessor P. Martin Duncan and W. Percy Sladen (see <i>Palaeontologia Indica</i> viii p. 144). But Mr. Fedden cont- g the Gulf of Cutch from Na- off the coast, is fringed with much exposed at low spring up to high tide level. The coral has very substitute for stone	Cutch. 1814
that the Mr Fe that he	Madura. 1815 Tinnevely. 1816 C. 1816

CORAL.	Coral Reefs.
CORAL REEFS	<p>Chattiram, the thickness of the coral reef exposed above the surface of the water is at least 10 feet, and probably much more." Further on he remarks: "At the Pamban end of the raised reef it shows a slight northerly dip, and masses of dead coral, apparently <i>in situ</i>, protrude through the sand below high water mark. Reefs of living coral fringe the present coast, but these I was unable to examine, so cannot say whether the corals now growing there are specifically allied to those which</p>
Trichinopoly. 1817	<p>the South Sea Islands, and the coral reefs of South India — y to coral s of fore</p> <p>me, rose the land of that remote age, worn and wasted, it may be, in the sequence of the myriad centuries that have since rolled over it, but in</p> <p>ination, I might have</p> <p>coral descriunalte</p> <p>rather surface. sh and labourd hard respect</p>
	<p>from a modern beach.</p> <p>"But though, to an uncritical eye, the shells of that old sea might seem very like the volutes, olives, cowries, and ark-shells now thrown upon the Madras sands (and perhaps, indeed, they were their remote ancestors), it needed but to look on the great coiled ammonites scattered here and there in the broken ground, to know of a surety that around me lay the relics of a cretaceous sea. When these enclosed and protected living organisms, the coarse sandy deposits that underlie our English chalk, were slowly accumulating in a shallow ocean, where now spread the corn-fields and hop gardens of Surrey and Kent, and on the sinking sea bottom of South-Eastern England, Northern France, and Belgium, the</p>

Ornamental Corals.

CORAL.

thousands of feet of white calcareous mud that, long since upheaved and hardened into chalk, greets the homeward bound Indian in the Dover Cliffs, had yet to be slowly extracted through long ages from the sea water by minute organisms long since extinct."

B.—ORNAMENTAL CORALS.

ORNAMENTAL
CORALS
1818

Very little can be learned for certain of the indigenous living ornamental corals. Indeed, it seems probable that in some of the passages already referred to, the term coral has been used in a generic sense, and

of the
series
ing
indige

since, for ornamental purposes, it is only the sclerobasic polypes that form a calcareous substance of sufficient consistence to admit of being cut

White

1822

1823

1824

1825

1826

1827

1828

1829

1830

1831

1832

1833

1834

1835

1836

1837

1838

1839

1840

1841

1842

1843

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1845

1846

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1848

1849

1850

1851

1852

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1854

1855

1856

1857

1858

1859

1860

calls "club-shaped Porites" He also says — "I have noticed in the bazars, though I have never gathered it on the coast, a curious species of coral resembling the horse-tail Isis It is branched like a tree with white striated stony joints and black horny smaller joints between, which render the whole flexible" It may be here remarked that many of the sclerobasic corals have a flattened or portion of a columnar

long moss, also occurs, and "black coral," of which beads are made, is brought from the Mergui Archipelago" Of Tenasserim Mason further says — "A tree coral two feet long, of a deep scarlet, is found on the coast, which the residents often call 'red coral,' but it is not the red coral of commerce, it does not grow like that, and the red colour is confined to the epidermis, the substance of the coral within being grey"

In concluding this brief review of the literature of the Indian ornamental corals, it must be admitted that we are grossly ignorant of the subject. There are no coral fisheries in India, and we do not know whether or not this is due to the absence of corals of commercial value, nor do we possess any knowledge as to the likelihood of the more

1823

CORAL.

Trade in Corals.

valuable corals succeeding, if introduced into Indian waters. No effort has as yet been made to propagate new species or improve the existing Indian corals.

TRADE.
1829

TRADE IN CORAL.

Some conception may be arrived at of the magnitude of the trade in Coral when it is recollected how many races of people in India regularly wear necklaces of coral. How far the prized ornaments may be derived from India, we are not able to say.

Prepared,
1830

Beads.
1831

Imitation,
1832

supplies, are sub-Indian trade. The bulk of the coral bought by those classes to be worn as necklaces, the coral beads, when a man is prosperous, alternating with gold beads. Almost all the coral we receive is brought to Calcutta, whence it is distributed over the provinces mentioned, to be sold chiefly at the larger fairs. It is principally

real.

MEDICINE.
1833

Medicine.—In addition to being used for adornment ornamental corals have been used for medicinal purposes from a very ancient time and are used by being ground and corals are used for consumption, and "Ainslie" when calcined

Corallocarpus

CORAL
wort.

CORALLOCARPUS, Welw, Gen Pl, 1, 831.

Corallocarpus epigœa, Hook f.; Fl. Br. Ind, 11, 628, Wight, 1834

[Ic, t 503; CUCURBITACEÆ
Syn — BRYONIA EPIGŒA, Rottler, B GLABRA, Rarb; ARCHMANDRA EPI-
GŒA, Arn in Hook, Jour Bot, III, 274

Vegetation in the ...

... ..

References — Roxb Fl Ind, Ed C B C, 702 Ainslie, Mat Ind, 11,
158, Dals & Gids, Bomb Fl, 100, Dymock, Mat Med W Ind,
and Ed 353, Murray, Pl and Drugs, Sind 42 Moodeen Sheriff,
Supp Pharm Ind, 78, O Shaughnessy, Beng Disp, 347, Pharm
Ind, 98 Walker in Bomb Med Phys Trans, 1848, p 60, Drury,
U Pl, 57, Trimen, Syst Cat, Ceylon Pl, 38Habitat and south
CeylonMedic
resembles ...MEDICINE.
Root.
1835Juice,
1836Corallocarpus epigœa is usually administered, he says, in powder,
which is of a very pale colour, in doses of a pagoda (about one drachm)

Dispens, 302) Conf. with Bryonia, B 94.

Coral plant, see Jatropha

Coral tree, see Erythrina.

Coral-wort, see Dentaria bulbifera

CORCHORUS
acutangulus.

The Angular Fruited Corchorus.

JUTE.
1839

CORCHORUS, Linn.; Gen. Pl., I., 235.

The generic name for this group of annual plants is derived from the property of the leaves (*κορη* the pupil of the eye, and *κορηω* to purge or clear).

1840

Corchorus acutangulus, Lam.; Fl. Br. Ind., I., 398; Wight,
[TILIACEÆ.

Syn.—*C. ruscus*, Roxb., Fl. Ind., Ed. C.B.C., 429, t. 739

Vern.—*Tilápát*, BENG.

References.—*Dale and Gills*, Bomb., Fl., 25; *Kurz*, Contrib. Burmett Fl., 130; *F. von Mueller*, Sel. Extra-Trop. Pl., 88.

the nodes
g woolly
e upper
t paral-
most);
base of
groove.
i patch

wild species in India,

the hotter parts of India and Ceylon. Roxburgh remarks that it flowers during the rainy and cold seasons, is never cultivated, and differs from *C. tridens*, L., in having only one style; and from *C. trilocularis*, L., in having only one row of seeds in each cell. Dalzell and Gibson say that in Bombay it is a common weed, and Roxburgh that it is a native of various parts of India.

all over Burma
angulus as
lar for the
nly is the
all is the
ilocularis.

C. 1840

The Round Fruited Corchorus.

CORCHORUS
capsularis.

JUTE.

the tips spreading somewhat as in *C. acutangulus*. Duthie's 7,121 has the foliage, capsules, and hairs of *C. trilocularis* with the seeds of *C. olitorius*."

Fibre.—A coarse fibre is sometimes extracted from this species and Mueller alludes to this plant as an occasional source of jute.

FIBRE.
1841

1842

Corchorus Antichorus, Roemer, *Fl. Br. Ind.*, I., 398; Wight, *lc.*, [t. 1073.

Syn.—CORCHORUS HUMILIS, Munro, ANTICHORUS DEPRESSUS, Linn.

Vern.—Bophull, HIND, Baphalli, kurand, bophalli, bahuphalli, babuna, PE, Mudhtri, SIND.

References.—Dals. & Gbs., *Bomb. Fl.*, 25; Murray, *Pl. & Drugs*, SIND, 65.

FIBRE.
1843
MEDICINE.
1844
FODDER.
1845
1846

by camels.

C. capsularis, Linn; *Fl. Br. Ind.*, I., 397; Wight, *lc.*, t. 311.

Vern.—Gh-nalit-pat (according to Roxburgh); Narchi according to U. O. Dutt, BENG. The last mentioned author in the Glossary to his Mat. Med. of the Hindus gives this plant the Sanskrit name *kalsadha*.

1847

CORCHORUS
capsularis.

The Round Fruited Corchorus.

JUTE

References.—Roxb., *Fl. Ind.*, Ed. C.B.C., 429; *Louretto, Fl. Coch. Ch.*, VI., 408; *Rumph.*, v. 1. 78, f. 1; *Voigt, Hort. Sub. Cal.*, 127; *Brandis*,

Botanic Diagnosis.—Alone distinguishable from *C. oltorius* by the short rounded capsule—a very unimportant character, Gamble's No. 15,912 has one capsule nearly round, while the others are distinctly those of *oltorius*, but some are 4-valved, others 5-valved. Kurz's No. 1231 of *C. acutangulus* has both 4- and 5-valved capsules, and Clarke's No. 24,899 has a 3-valved capsule. Clarke's No. 31,637 of *C. trilobularis*, has a 4-valved capsule, and Hooker and Thomson's sample of that species, from the Panjab, has a 3-valved capsule. The capsule is thus variable.

Habitat.—A common plant "throughout the hotter parts of India" This statement, originally made by Roxburgh, is current in the literature of jute. While it need not necessarily be implied that a plant is wild (e.g., indigenous) in the area where it is common, still that is the opinion popular writers have derived from the above carefully worded botanical description. The major portion of all we have learned regarding

favoured the writer with a note to the effect that he found *C. capsularis* in

condition, and which of Corchorus list of the that it is the other dens) has

sheet of Corchorus tivated" has not should have had cept perhaps one ever, may be an knowledge Burmese uently seen in de- aged trees, or along the borders of forests, and villages, &c." It is

It represents the Vallich, Griffith, ot be a specimen a Mr. Talbot n's specimens of irium, have not rked as cultivated.

nd fruited the only ered from on in pro- deceman- educed to of Bengal. (" deceman- non as to

C. 1849

The Round Fruited Corchorus.

CORCHORUS
capsularis.

its nativity. Edgeworth says of the Banda district, N.W. Provinces,

JUTE.

that *C. capsularis* does not occur in Madras. DeCandolle, after enumerating all the countries where the plant is cultivated (*vis*, the Sunda Islands, Ceylon, India, Southern China, the Philippine Islands, and Southern Asia generally) says: "I am not convinced that the species exists in a truly wild state north of Calcutta, although it may perhaps have spread from cultivation and have sown itself here and there."

The writer speaks of a greater portion of that e across either *C. capsul* wild or rather indigeno in some parts of Western India, but grave doubts may be entertained as to either being natives of Bengal,—the province where they are now mainly cultivated, and where they exist frequently enough as weeds around the cultivated jute fields. The suggestion is offered, that, by experimental cultivation, it might be found possible to produce forms of *Corchorus* from some of the truly wild species which would closely approximate to *C. capsularis* and *C. olitorius*. With the imperfect knowledge we possess of this subject, the writer would be much more willing to admit the possibility of some such theory, to account for the cultivated jutes, rather than believe that manifest escapes from recent cultivation are the sole survivals of the wild forms of these plants. The scientific distinction based on the length of the fruit vessel (round in *C. capsularis* and elongated in *C. olitorius*) is, to say the least, scarcely worthy of as much consideration as the peculiarities recognised by the cultivators in distinguished forms that yield the distinction in the shape to give origin to certain species of *Albizia*, all of which can be produced from the seeds of any one by careful cultivation.

It is noteworthy that definite Sanskrit names should not exist for these most useful plants, while other plants of far less value have assigned to them names so precise as to distinguish their varieties, to separate their wild from their cultivated forms, and to indicate every possible structural peculiarity. There are neither Arabic nor Persian names for the

1850

1851

CORCHORUS
capsularis.

The Round Fruited Corchorus

JUTE.

urged that when Roxburgh was told that the plant grown in the Botanic Garden was jute, there were in all probability no such dealings in the fibre between Calcutta and Eastern Bengal. Besides, Mr Kerr rejects this derivation of the word, on the ground that jute is in no way a waste, rejected, by-product or remnant, as would be implied by the word *uch-chista*. At the same time Mr. Sen's idea would simply be that it was in

1852

Roxburgh were most probably, as at the present day natives of Orissa, and that, therefore, the name jute given by Roxburgh, the first European writer who used that name, was in all probability a softened form of *jhot*, a word which may be admitted to have come from the Sanskrit *jhuta*, unless we presume Mr. Sen's derivation of the word to have prevailed all over Orissa prior to Dr. Roxburgh's discovery of the plant.

1853

The Sanskrit word *Nadika* is said by Dutt to have been given to *C. olitorius* and *kalasaka* to *C. capsularis*, but while Dr. Dutt's work is devoted to the *Materna Medica* of the Hindus and is compiled from Sanskrit medical works, he only gives the above names in a Glossary at the end, and does not attribute to the plants, to which he says they refer, any properties as known to the Sanskrit writers, while the modern Hindus use the leaves of jute and the species of *Corchorus* generally, both as food and medicine. Dr. Moodeen Sheriff, a high authority on vernacular

names does not give a Sanskrit, Arabic or Persian name to the species in use in
ribited as
to jute
or other.
usage it
lly given
mention-
roduced).
irs in the
that it was then
the root from
derived, no-
e, nor indeed
operty of jute
patta may be
hata patra,ka,
would suggest

1854

a later introduction than *Crotalaria juncea* to which *pattu* is compared. This idea receives further support from the fact that while *sana* occurs in the most ancient Sanskrit works, *patta* appears in the comparatively recent. In one of the references to *patta*, it is spoken of as the *chimi* (probably a misspelling for China) *pât*, a fact which would point to the cultivated jute plant having come to India from China. Mr. Hem

C. 1854

The Tufted Corchorus

CORCHORUS fascicularis.

JUTE.

Ohunder Kerr rev to fibre or to rope cations does there several works *pat* form of hemp but which by the home authors was pronounced to be more nearly allied to flax By the beginning of the present century the word

the cultivation of the plant has been introduced from some other country and most probably subsequent to the date of even the most recent Sanskrit works If a modern development we can scarcely admit that the stock from which it was derived could have disappeared while numerous wild plants closely allied to *Corchorus capsularis* and *C. olitorius* are fibres only inferior The seat of the district through ng lands of the *olitorius* on the other hand, occurs tern side of the Hooghly river, and in Western and Southern

Although there are numerous references to *Pattia Jutā* &c. in early Indian writings enough has been said to show that the greatest caution

British rule and in a fourth it is put down at 400 years ago In all districts it is spoken of, however, as a crop regarding which some period could be fixed, while no such language is used with regard to rice, cotton, sunn hemp, or any other crop of an importance at all comparable with Jute (*Conf with C. olitorius in a further page*)

Fibre—See a further page, and also Jute

Medicine—The leaves dried are used medicinally being eaten at breakfast time with rice in cases of dysentery The cold infusion is also administered as a tonic in dysenteric complaints, fever, and dyspepsia

Oil—'The seed when fried over the fire yields an oil chiefly used for lighting purposes' (*Ramshunker Sen Agr. Gaz.*, 1863)

Corchorus fascicularis, Lam. ; *Fl. Br. Ind.*, I 398

Vern.—*Hirankhorī*, *bhauṣṭhali*, Boms, Yangli or *ban pāt*, *bil* *nalita* BENG

ṛ mō k

bāphull is also given to *C. Antichorus*

References—*Roxb. Fl. Ind.*, Ed. C. B. C., 429 *Dymock, Mat. Med.* *W. Ind.*, 2nd Ed. 115

Botanic Diagnosis—Capsules small ($\frac{1}{2}$ – $\frac{3}{4}$ inch) almost cylindrical, very hairy beak 3–4 splitting with the dehiscence of the capsule Seedstran gular or diamond shaped, more pointed at the lower end and very similar to those of *C. olitorius* but smaller

FIBRE.
1855
MEDICINE
1856
OIL
1857

1858

C. 1858

CORCHORUS
olitorius.

Jew's Mallow

FIBRE.

1850
MEDICINE.
1860

Habitat —A common wild plant throughout the hotter parts of India from the Panjab to Bengal, and westward to Bombay (common, for example, at Surat). Distributed to Ceylon

Fibre —The fibre extracted from this plant is employed in Sind in the manufacture of ropes.

Medicine —Sakharam Arjun mentions the fact that the whole of this watery extract mixed
It is also given in
by the "whole plant
somewhat astringent

and is valued as a restorative " The name *hivrankhor* given to it, means deer's hoof

1861

Corchorus olitorius, Linn ; *Fl Br Ind*, 1, 397

JEW'S MALLOW

Vern —*Pat*, *koshta* (*bhunyi pat*, according to Drury, and *bhunyi*, in *ji pat*, *bhunyi* or *ban ascha*, *koshta* (according eddy, *Tam Panula* in N-W P (Atkins- rding to Dutt), *patla* (according to KUXU, and *Sing gien* (according to Ainslie), *SANS*

— speak
so used
li *nahis*
dits by
ins, the
ig, and
narchd
itorius

Sir Walter Elliot alludes to this species but makes no mention of *C. capsularis*, and neither assigns *Jutá* nor *Patta* to Jute

1862

Ainslie was perhaps the first European writer who assigned to this plant the Hind name *singgin-ganascha*, and while this has been reproduced by several subsequent authors the word does not appear to be in use in India at the present day, at least not in Hindustan proper. The Sanskrit names given above have already been commented on under *C. capsularis*. Mr Hem Chunder Kerr points out that the word *bhunyi* (given by various authors

— present day. It is
alls in a
t gunny
In ever
with that
reduced
n hemp

References —

387 *Roxb* *A - 10 Mat Ind*, 11,
& Gibs, *Bon* *ds*
333, *Atkinsc* *d*,
Mooden Sheriff, *Supp Pharm Ind*, 114, *Murray* *r*,
Sind 64, *Benson* *Saidapet Exper Farm Man*, 63, *DeCandolle*,
Origin Cult Fl, 132 *es*

Botanic Diagnosis —Glabrous except the upper half of the petiole, and the primary veins on the under surface, where woolly hairs occur, nervules transverse, nearly parallel, pellucid, and anastomosing. Capsule very long and glabrous, beak straight, remains of the flower forming a thick scar. Seeds somewhat triangular, pointed at both extremities, but much more so to the hilum, surface often roughened, so as to appear as if minutely hairy

C. 1862

or Edible Corchorus

CORCHORUS
olitorius.

JUTE

Bombay, and Talbot (a botanical observer whose opinion must carry considerable weight) remarks "Abundantly wild about Yellapur" Dr Gibson has left a specimen of this species in the Calcutta Herbarium

brous the capsules are hairy along the angles and have a few of the peculiar tufted hairs of *C. trilocularis*, as well as the long narrow capsules of that species. It has also the thick and somewhat linear, coarsely serrated, leaves peculiar to that plant, but the leaves are not only hairy but have a few of the tufted glandular hairs on the under surface as well as on the fruit. Kurz gives the habitat of *C. olitorius*, as far as Burma is concerned, as "Ava, Pegu, cultivated and wild in rubbishy places and agrarian lands." Atkinson says that it is found in "Dehra Dun," but in this connection it may be added that in the Saharunpur Herbarium while there are specimens of the allied species, *C. acutangulus*, from various localities in the North Western Provinces and the Panjáb, there are none of *C. olitorius*. One specimen of *C. acutangulus* is marked as collected at Dehra Dun, and it is probable this may be the *C. olitorius* alluded to by Atkinson, Stewart, and other writers on the Flora of Northern India. In the report (to which reference has been made under *C. capsularis*) on jute cultivation in Madras, it is stated that a considerable amount of *C. olitorius* is grown in Ganjam, Godavery, Kistna, and Nellore but not for its fibre. The Collectors of Ganjam and Godavery say it is wild in their districts. The only district in the southern parts of the Madras Presidency where the plant was discovered was Salem, the Collector having found a specimen on the margin of a field, which Dr Bidie identified as *C. olitorius*. A sample of *C. trilocularis* is, however, in the Saharunpur Herbarium named *C. olitorius*, and this was apparently collected by Mr J S Gamble in the Kistna District, it bears the number 12662. The merest possibility of such a mistake existing regarding the Kistna samples reported on above may be admitted as sufficient to throw a doubt on the indigenous character of *C. olitorius* in even the northern districts of Madras. At all

1863

plant that yielded the so-called jute of their former communication was a species of *Crotalaria* and not of *Corchorus*. Roxburgh points out in the *Flora Indica* that there is a wild form of the plant known in Bengal as *ban-pat* or wild *pat* which has reddish stems. In his *Hortus Bengalensis*, he speaks of two varieties of *C. olitorius*, a green form (the *pát*) and a reddish (the *ban pát*). This opinion is accepted by Ainslie and by

1864

C. 1864

CORCHORUS
olitorius.

Jew's Mallow

JUTE.

O Shaughnessy, both of the reddish *C. capsularis* the present day, applied from either of the above wild in the Panjáb, but it does not give its Indian names, while he says it is the *ban-pat* of Bengal, a circumstance that would seem to justify the inference that Stewart's wild *C. olitorius* should be corrected into *C. fascicularis*, the more so since that species is undoubtedly wild in the Panjáb, although not alluded to by Stewart (*For another error committed by Stewart see the remarks under C. acutangulus*). At the same time the writer, on looking over the Saharanpur Herbarium collections found one specimen, apparently correctly named *C. olitorius*, which was discovered by Dr. Aitchison (No. 476), and on which the note occurs, "occasional from Thul to Kuram." The Saharanpur Herbarium, as already remarked, does not, however, possess a sample of *Corchorus olitorius* as found in the Panjáb proper.

1865

If, after carefully considering these somewhat conflicting opinions, we still believe that *C. olitorius* is indigenous to India; if, indeed, we accept

being viewed as indigenous rests at present on doubtful evidence, but it may at least be confidently asserted that it is not wild in the districts where it is now or ever has been known to be cultivated for its fibre

olitorius than for *capsularis*. The latter would appear to have been cultivated in China before the people of India had of Canton for

Osmia Mr. Hem

this name to the Sanskrit *au-ma* signifying 'hemp' call *C. capsularis*, *Rami tsjima* or Chinese hemp. But in the same way *C. olitorius* has been known to the Egyptians and Syrians for a very long time, their acquaintance with it being possibly prior to the date of the evidence of a positive character, that a knowledge of the properties of the plant was possessed by the inhabitants of India. The Greek *κορχορος* was applied to a pot-herb, but in all probability the plant alluded to was not the *Corchorus* of the present day. Accepting the derivation of the Greek word as implying a drug useful in the treatment of eye diseases, it may be pointed out that no such property is claimed for the species of *Corchorus*. It is perhaps only a fanciful idea, but this property of a collyrium associated with *μαμπα* and *μολαχίνα*

1866

or Edible Corchorus

CORCHORUS
olitorius.

Mallow. It began apparently to be cultivated in Egypt about the beginning of the Christian era. It is there known by an Arabic name *melokych*, a word which seems in Crete to pass into *maulchia* (Conf. DeCandolle). It will at once be seen that these Arabic names (if indeed they be Arabic) bear no relation to the vernacular synonyms given the Hindus) to any form of Muhammadans not having using their successive invasions years from the 7th

JUTE.

1867

And added the name of the plant to the list of the Jute plant.

Proterid's name—the name of the plant to the list of the Jute plant.

asserted that both forms of the jute plant are natives of Bengal, because they are plentiful weeds in cultivated situations. (Conf. with *C. capsularis*)

FIBRE.
1868
MEDICINE.
1869

are emollient and used in infusion as refrigerant in fevers and special diseases. The dried plant toasted and powdered is used in visceral obstructions."

Dr. K. L. Dé, O.E., says: "The dried leaves of this plant are sold in the market. A cold infusion is used as a bitter tonic, and is devoid of any stimulating property. Mr. Simon of Assam informs me that it

1870

FOOD.
1871

C. 1871

The Commercial Fibre.

CORCHORUS.

demulcent, and the seeds as a specific in rheumatism" (*Pl and Drugs, Sind, 65*)

The *Ulfas Udwyeh*, by Noured-din Mahomed Abdulla Sherazi, uses the name of *isbund* for a species of what appears to be mustard seed.

JUTE.

JUTE.

JUTE.
1879

In connection with the reports of the Calcutta International Exhibition the writer published the greater portion of the facts which will be found in the present account of the fibre obtained from the species of *Corchorus*. In a further volume the commercial aspects of jute will be given (see *JUTE*), while in the following pages an effort is made to present a general and historic sketch of the subject together with certain facts of economic interest connected with the species of *Corchorus*. It may here be stated that the

a trade in *Malachra capitata*. The reader is, therefore, referred to the ac-

Comm. and Vern. Names.—Jute, or Jew's Mallow, *ENG*; *Jute, mauve des juifs, corde textile, FR*; *Jute, GERM*, *Pat, BENG*. Roxburgh says that "the Bengalis call it jute," but Royle enters into an explanation of

References.—*Hem Chunder Kerr's Report on Jute and other Fibres in*

Corchorus

HISTORY OF THE JUTE INDUSTRY.

HISTORY.
1880

The history of the modern Jute industry is exceedingly interesting and intimately associated with the British rule in India. There can be no doubt that jute was known to the people of India from compa-

CORCHORUS.

The Jute Fibre

HISTORY.

... ..

sunni, *patta*, and *bhang* were synonymous and generic terms for fibre and coarse cloth, without much regard to the plant from which the fibre was obtained. If so, about the beginning of the present century, the word *pat* became fixed and associated with the fibre of *Corchorus olitorius* and *C. capsularis*. Prior to that date the Government returns of exports from India mention *hemp fibre*; this must have been either *sunni* or *jute*, since the true hemp fibre has not been cultivated for centuries at least and modern jute is not a hemp.

1881

largely clad in jute cloth of home manufacture, such as, at the present day, is used by the aboriginal tribes. The increased facilities for the importation of European machinery...

bags were required for this trade and were greedily bought up. The high price of the bags led to increased activity, and a recognised part of the Bengal peasant's work. By and by, however, European machinery began to compete with manual labour, and in due time it gained the day. Jute was exported to Europe for cordage, and ultimately for the manufacture of the bags required in the grain trade. The first commercial mention of the word "jute" is in the customs returns of the exports for 1823, when 364 cwt. were sent to Europe. Soon the agriculturist found that his time would be more profitably spent in preparing an extra *quar* of jute than in making bags to compete with steam and iron. The handloom was speedily outstripped the powerloom.

The jute trade took a new start in 1854, when no effort was made to improve the British manufacture. In that year, however, the "India Rubber Company" was established at Ishera near Serampore for the manufacture of coffee plantations in Ceylon, and the "Cotton Plantation Company, Limited," and are the first to have introduced the rubber tree into India.

The jute industry came into existence following these events. It rapidly increased in every direction around Calcutta. In the Trade Returns for

C. 1881

of European Commerce

CORCHORUS

was 6,441,863 gunny bags
brought into competition
steadily, and in 1879-80,
exported from India. The
relative importance of the export trade in raw jute, as compared with the
exports in manufactured jute of all kinds, may be seen by a careful

HISTORY.

This is of course a comparison between the total exports of raw jute and
a portion of the Indian manufactures. In a further page the relative
amount of Indian manufactured jute exported as such and the amount used
up locally or devoted to the export trade in grain will be found. But

which the jute manufactures have passed out of the hands of the Indian
peasants, who alone, little more than 40 years ago, met the demand for
gunny bags. This is seen very clearly when the above figures are com-
pared with the exports of 1850-51. At that time the value of the gunnies
exported was greater than that of the raw jute,—the former being
£215,078, the latter, £197,071. There were no European factories in
India in 1850, so that the market was supplied by the Indian peasant's
hand loom. Steadily the exports increased, the demand for gunnies
calling into existence the Dundee mills, and soon after the Indian fac-
tories. Nothing could demonstrate the development of the jute trade
more than a careful examination of the exports of raw jute and manufac-
tured jute from 1854 to 1887. During that period 24 factories, larger

1882

Dundee and other foreign manufactures.

CULTIVATION AND PREPARATION OF THE FIBRE.

CULTIVA-
TION.
Area.
1883

ed
ten
Go
hae
20
wit
that more than half the annual yield of fibre is exported to foreign coun-
tries and mainly to Great Britain and the United States of America, the

CORCHORUS

The Jute Fibre

CULTIVA-
TION

Tipperah 117,000, Furreedpore 85,000, Rajshahye 45,000, 24 Parganas 44,000, Dinagepore 40,000, Bogra 34,000, Nuddea 30,000, Jessore 30,000, Khoolna 30,000, Purneah 24,000, Hooghly 19,000, Goalpara 15,000

In other provinces, jute, though occasionally cultivated, is rarely so on

Impossible
in Madras
1884

to Government on certain samples of jute produced in "Jaula" etc.

Madras Manual (Vol I, 361), it is stated that a portion of the jute used by Messrs Arbuthnot & Co is produced locally, "but it is hoped that before long the supply will be drawn entirely from the district." Recent experiments have, however, been made in order to discover whether the true jute plant could be profitably grown in Southern India. Mr Benson (in his *Saidapet Experimental Farm Manual and Guide*, page 63) gives the result, arriving at the conclusion that, unless some parts of the Northern Division be more suitable, jute cannot be grown in Madras. So in a like manner it has been tried in Bombay and Burma, with apparently the final verdict that, in these provinces, it cannot be produced at a price to compete with Bengal. The plant can be grown most successfully in Burma, but the cost of labour has proved fatal to any idea of an extensive commercial industry. In 1872-73 Mr Hem Chunder Kerr estimated that there were one million acres under jute in Bengal and Assam distributed over 37 million acres of country, and that should the

Actual area
1885

per acre.
in 1884
maunds
assumption
8 maunds
Upon
to 1884
to 1880.
ts of jute

into Calcutta were carefully recorded and the above figures may therefore be accepted as indicating the expansion of the area under jute in Bengal. As confirmatory of this general conclusion, based on the pub

*An effort has been made to correct returns in maunds into cwt as being more likely to be understood by European readers, but where this has not been done, the result may be arrived at by the following simple rule: maunds $\times \frac{1}{4}$ = cwt

C. 1885

of European Commerce

CORCHORUS

lished figures of imports into Calcutta and Chittagong, it may be here added that Mr. Finucane (Director of Land Records and Agriculture in Bengal) in his report of 1886 on the jute trade furnished him by Varamungge Hejute of 400lb each. Wilson adds the mills in Bengal,

CULTIVATION.

but the
tion of
Mr. Finucane
on the
tration

1886

afford responsible for the italics in the above quotation. It is desirable to draw attention to the fact that the record of the jute trade preserved by merchants bears a close approximation to that tabulated by Government from the very extensive and complicated returns of road, river, and railway traffic, the concentration in the ultimate centre thus being seen to preserve a distinct relation to the far-reaching ramifications of the stream of supply. But Mr. Finucane concludes his review of Mr. Wilson's figures as follows:—"If the annual average of the eight years ending 1884-85 be taken into consideration, the difference between the two sets of figures is not considerable, the estimate worked out in this office from the data above described being only 3.97 per cent less than that of Mr. Wilson."

Soil.—Jute seems to be capable of cultivation on almost any kind of

Soil
1887Climate
1888

down

Preparation of Soil.—It may be stated that, when the crop is to be raised on low lands, where there is danger of early flooding, ploughing commences earlier than upon the higher lands. The more clay in the soil, the more frequently it is ploughed before sowing. The preparation thus commences in November or December, or not till February or March, the soil is generally ploughed from four to six times, the clods are broken and pulverised, and at the final ploughing the weeds are collected, dried, and burned.

Preparation
of Soil
1889

Seed.—No special attention is paid to the selection of good seeds, nor do the cultivators buy and sell their seeds. In the corner of the field a few plants are left to ripen into seed, and these are, next year, sown broadcast. The sowings, according to the position and nature of the soil, commence about the middle of March and extend to the end of June.

Seed
1890

Harvest.—The time for reaping the crop depends entirely upon the date of sowing; the season commences, with the earliest crop, about the end of June, and extends to the beginning of October.

Harvest.
1891

C. 1891

CORCHORUS

The Jute Fibre

CULTIVATION

The crop is considered to be in season whenever the flowers appear, and past season, with the fruits. The fibre from plants that have not flowered is weaker than from those in fruit, the latter is coarser and wanting in gloss, though stronger. It is late reaping that is chiefly accountable for the coarse fibre found in the market.

Crop
1892

Crop—The average crop of fibre per acre is a little over 15 maunds, but the yield varies considerably, being as high as 30 to 36 in some places, and is also very dependent on the soil, the ground, and the average yield.

Retting
1893

Of late years, to give time for the decay of the leaves, to discolour the fibre in the retting process, in others the bundles are carried off and at once thrown into the water. There is some ground for thinking that, if the drying of the leaves by stacking does not prevent the discoloration of the fibre, the fibre itself is likely to be benefited by the process, since it is found to separate more readily from the stem, and is thereby saved from the danger of rotting from over maceration. In some districts the bundles of jute stems are submerged in rivers, but the common practice seems to be in favour of tanks or road-side stagnant pools.

It varies from two to twenty days, and the bundles are visited the tank daily, and ascertained when they have begun to separate from the stem. This period must not be exceeded, otherwise the fibre becomes rotten and almost useless for commercial purposes. The bundles are then taken to the top of them sods and mud is rapidly completed.

water, proceeds to next the roots, and, the management brought

to wash his head, it through throw, he all remain water as dry in the

Extraction by
Machinery
1894

It is doubtful if a simple machine could be invented for the purpose, secured even by the poorer cultivation, industries might spring into machinery will, for some time, and that the principal mineral or patent process is known as Garwood's Patent. It does no more than to separate the stem, and the fresher the stem, the more easily is the bark separated.

C. 1894

Mr W Cogswell, however, who is an undoubted authority on all questions connected with jute, expressed in December 1881 his opinion that a softer fibre was obtained by the old process (*vide A H Society's Proceedings, December 1881*)

PROPERTIES OF JUTE FIBRE.

Chemical and Microscopic—"The fibre, as found in commerce, consists of the fibre bundles separated from the cortical parenchyma. The bundles contain 6 to 20 fibres. The fibres are firmly coherent in the bundle, the cohesion taking the form of fusion of contiguous walls, the line of fusion being very apparent. The ultimate fibres are of the normal fusiform type, 1.5-3 mm in length. In section they are seen to be thick walled and polygonal. *Reactions*, characteristic of the jute-allied group of fibres, are brown with iodine, deep yellow with aniline sulphate, purple with phloroglucol and hydrochloric acid, a strong affinity for the basic colouring matters. *Mercerised fibre*—*Microscopic features*. Concentrated solutions of the alkalis have a remarkable action on fibres of this group. They resolve the bundles more or less completely, and cause the fibre wall to swell so as to almost obliterate the cavity. The filaments, in addition to being made finer, are much softened in texture, and develop a wavy outline, giving the fibre very much the appearance of wool' (*Cross, Beavan, King, and Watt, Report on Indian Fibres, p 36*). The chemical analysis, as given in the report just quoted, may be here briefly reviewed. Jute, in point of percentage of cellulose (perhaps the best criterion for judging of the value of a fibre), is about equal with Urena 77.7, Calotropis 76.5, Abutilon 75.0 and Agave 75.8, and follows after Abroma 80.0, Rhea 80.3, Flax 81.9, Sida 83.1, Crotalaria 83.0, Marsdenia 88.3 and Girardinia (Nilgiri nettle) 89.6. Jute possesses 76.0 per cent, and is thus in point of cellulose about the eighth most valuable fibre in India. It is noteworthy that of the fibres enumerated—Abutilon, Urena, Abroma, Sida, and Jute are obtained from closely allied plants and yield very similar fibres. But of these jute is the next to the last in point of chemical merit, Sida being the first of the series. This is a fact of the greatest importance, when it is added that the experts who examined these fibres at the Colonial and Indian Exhibition pronounced

PROPERTIES
OF JUTE
1895

Mercerised,
1896

Cellulosa,
1897

Ash,
1898

the cell cavity completely, thus causing the filaments to become much finer and softer in texture. By nitration jute gains in weight, becoming 128, being in this respect inferior to any of its allied fibres, but it is found to contain 47 per cent of carbon having the highest amount of any recorded Indian fibre, Sida, for example, possesses 45.2, flax 43.0, and Bauhinia fibre only 40.7

C. 1898

CORCHORUS

The Jute Fibre

PROPERTIES
OF JUTE.

The results of the chemical and microscopic investigation of jute, instituted by Messrs Cross, Bevan, and King, may be briefly stated to

Strength
1899

wool

Strength and Industrial Properties.—Royle's remarks "Jute is certainly characterised by fineness, silkiness, and facility of spinning, but it is less strong than many other Indian fibres, which are possessed of similar

1900

to the cultivator's necessities and the manufacturer's wants. The question is not, therefore, one as to whether jute or *Sida* is more easily cultivated and gives the better result in point of yield of fibre, but whether the intrinsic superiority of *Sida* fibre would justify its experimental and systematic cultivation until a stock was produced that could be grown as readily and admit of as rapid decortication as is the case with jute. The plant is wild to-day, and it is unfair to compare the yield of fibre from such a plant with results obtained from jute. After careful cultivation for 10 or 20 years it would be fair to compare the ease of cultivation and yield of fibre in *Sida* with that of jute and during this experimental stage remunerative returns might easily be obtained since there can scarcely be two opinions as to the superiority of *Sida* over jute for the finer textile purposes. Roxburgh found in his comparative tests of the fibres of India that a "dry line" of *Corchorus capsularis* broke with a weight of 164lb and a "wet line" with the same weight, whereas *Corchorus olitorius* gave way with 113 and 125lb respectively, the wet line gaining 11lb in weight. This fact of the superiority of the fibre of *capsularis* over *olitorius* is well known in modern commerce. To compare with these results it may be mentioned that, under the same test, a "dry" and a "wet" line of sunn-hemp broke with 160lb and 209lb, respectively, the latter gave way after being soaked in water for 24 hours. *Corchorus* give way observed in the tanned ropes, but the tarred seemed to preserve strength considerably, the line fresh and tarred broke with 61lb, and after maceration for 116 days bore a weight of 60lb.

1901

The defect of jute is the difficulty to spin the higher counts 20 being about the finest made commercially, and when manufactured the fabric lasts well, so long as it is not submitted to a damp influence, but rots rapidly when damp and exposed to the atmosphere.

C. 1901

of European Commerce

CORCHORUS

PRICE OF CULTIVATION

No trustworthy figures are available of the prime cost to the cultivators of raising and extracting a maund of jute fibre. But the following figures which have been kindly furnished by a mercantile firm lead to the rates paid to the growers. Jute landed in Calcutta cost as follows per maund in the four years ending 1883 —

PRICE OF
CULTIVATION
1902

Qualities		1879-80	1880-81	1881-82	1882-83
		R a p	R a p	R a p	R a p
Narayanj	Fine	5 2 9	5 0 3	4 15 0	3 7 6
	Medium	4 9 6	4 6 9	4 3 4	2 15 2
	Common	4 0 9	3 13 7	3 10 4	2 7 6
Seraganj	Fine	5 4 0	5 2 0	5 1 0	3 9 0
	Medium	4 1 0	4 8 0	4 4 0	3 1 0
	Common	4 2 0	3 15 0	3 12 0	2 9 0

The average prices for the last four years were as follows —

	Bengal	Assam
	R a p	R a p
1883-84	3 12 0	4 0 0
1884-85	3 4 0	2 13 0
1885-86	3 4 0	3 1 0
1886-87	3 10 0	3 2 0

The charges per maund incurred from the time the jute is purchased from the producer to the time it is landed in Calcutta are approximately as follows —

	Narayanj	Seraganj
	R a p	R a p
Freight to Calcutta	0 8 0	0 8 0
Unloading, shipping &c	0 2 0	0 2 0
Attda	0 2 0	0 2 0
Bepasport	0 5 0	0 5 0
TOTAL	1 1 0	1 1 0

Deducting the charges just shown from the cost of the jute landed in Calcutta will give the rates paid to the grower thus —

Qualities		1879-80	1880-81	1881-82	1882-83
		R a p	R a p	R a p	R a p
Narayanj	Fine	4 1 9	3 15 3	3 14 10	2 6 6
	Medium	3 8 6	3 5 9	3 2 4	1 14 2
	Common	2 15 9	2 12 9	2 9 4	1 6 6
Seraganj	Fine	4 3 0	4 1 0	4 0 0	8 0
	Medium	3 0 0	3 7 0	3 3 0	2 0 0
	Common	3 1 0	2 14 0	2 1 0	1 5 0

The prime cost to the cultivators must be something lower than the figures shown in this last statement, and assuming that the data fur

CORCHORUS.

The Jute Fibre

PRICE OF
CULTIVA-
TION.

nished are near the truth, if not correct, they lead to the following impor-
tant inferences, *vis*, (a) that the p-
during the past few years, and (b) t
men have not varied, those of the
with the fall of prices in Calcutta.
siderably; a good year induces an indiscriminate extension of the area
which must of course be attended the following year by a fall in price,
and from the

from all sources was practically the same as in the previous year; while
the value of the exports from Chittagong was twenty-seven lakhs more

1903

May, when the young plants were seriously damaged by floods which
accompanied the cyclone, especially in the districts of Rungpore, Raj-
shahye, Dinagapore, Bogra, Julpigoree, and parts of Hooghly. These
localities, however, excepting Rungpore, are not of first-rate importance

said that
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normal,
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id on the
August."
which
rice of
to the

	Average whole- sale price in 12 selected districts in Bengal.			Average declared value as per Custom House Returns		
	R	a.	p.	R	a	p.
1876-77	3	0	0	4	4	0
1877-78	3	0	0	4	12	0
1878-79	4	0	0	4	10	0
1879-80	4	10	6	4	13	0
1880-81	4	8	0	4	14	0
1881-82	4	8	0	4	14	0
1882-83	3	8	0	4	1	0
1883-84	3	12	0	4	12	0
1884-85	3	4	0	4	1	0

C. 1903

COMMERCIAL VARIETIES

COMMERCIAL
VARIETIES.
1904

There are several well known commercial VARIETIES of jute fibre, of

order those of importance being marked *

I Bakrabad — A beautiful soft fibre, one of the finest qualities from the

2 r rope
south

3. ' chiefly
e near

Faridpur where there was formerly a large mart for this variety of jute. The name is given to all the jute from Backerganj and Faridpur.

4. * *Desi* (in commerce *Daissee*)—This is a useful and good fibre, largely used for gunnies, it is long, soft, and fine but it has a bad colour and is pronounced 'fuzzy'. It is produced in the

5 *

ganj and is said to consist of two kinds or sub-varieties —

(a) Bilan Deswal, or fibre from the crop grown over *bhals* or marshes

(b) Charna Deswál, or fibre from the crop grown on *chays*

6 Jangipuri—A poor fibre short weak, and more suited for paper manufacture than for spinning. It comes from the Pubna district.

7 Karimganji.—A fairly good fibre very long and of good colour. It comes from the Mymensingh district, taking its name from a

88

9

10 "

II "

These 11 qualities and others of minor importance, are in commerce generally grouped under four leading classes represented by the *Seraj-ganj*, *Naranganj*, *Desi*, and *Deora*, and these, again, are classed as "Fine," "Medium," and "Common," according to the qualities of the fibres. Mr James Duffus, in a letter addressed to the writer, says of this

1905

C. 1905

CORCHORUS.

The Jute Fibre

COMMERCIAL
VARIETIES.

subject: "Every small mart in Eastern Bengal has a jute of its own, quite as worthy of mention as many of the minor forms alluded to above." This remark has an interest beyond that of commerce, for we must either

FOREIGN
TRADE
1906

FOREIGN TRADE IN JUTE AND JUTE MANUFACTURES.

F
The
dust
tion of the plant, and of the Indian manufactures.

INTERNAL
TRADE
1907

INTERNAL AND COASTING TRADE

.. .. . used under the
me Consumption
to indicate very
various existing
modes of conveyance In a special Report on this subject Colonel L. but he refers
by him he
and Chittagong, the latter
the foreign
e of British

India for that year the foreign exports were put down at 8,369,636 cwt and the coasting trade at 1,267,034 cwt, making a total of jute shipments from Indian ports of 9,635,720 cwt Colonel Conway-Gordon gives the total imports into Calcutta as 9,392,813 cwt, of which 3,579,062 cwt were conveyed by native boats, 1,969,237 cwt by steamers, 3,482,522 cwt by the Eastern Bengal Railway, 148 cwt by the South Eastern State Railway, 356,496 cwt by road, and 5,348 cwt by sea. Thus the COUNTRY BOATS head the list, carrying to the sea-board 38 1

1908

to the mills it would be seen that jute is of importance to a far greater number of persons than to the 50,000 who find daily employment in the

* For the purpose of allowing of comparison with the returns of foreign trade, Colonel Conway-Gordon's figures of maunds have been converted into cwt

C. 1908

of European Commerce

CORCHORUS.

European factories But even this estimate would leave out of all consideration the indigenous hand looms that are still able to compete with steam in the production of jute cloth, bags, and cordage

HOME
MARKET

RAW JUTE

EXPORTATION AND HOME CONSUMPTION

EXPORTS.
1909

The following abstract of the EXPORTS OF RAW JUTE FROM CALCUTTA will be found interesting, as showing the steady and constant increase and development of the jute trade The mean exportations for

Up to	Average of five years in cwt
1832-33	11 800
1837-38	67 483
1841-43	117 047
1847-48	234 055
1852-53	439 850
1857-58	710 826
1861-63	969 724
1867-68	2 628 10
1871-73	4 858 162
1877-78	5 362 267
1882-83	7 274 000

The foreign exports of raw jute were, in 1882-83 10 348 909 cwt

1910

sent an increase in value from R620 to R5 84 69 259 in the short period of 55 years (e.g., from £62 to £5 846 925 for exported raw jute alone) speaks volumes for the noble fleet of merchant vessels trading with our Indian ports Mr Hem Chunder Kerr, in his valuable *Report on*

the held of European commerce

The figures of Indian trade show that the exportation of jute steadily increased from 1 092 668 cwt in 1860-61, to 3 754 083 cwt in 1870-71, that in 1871-72 it suddenly rose to 6 133 813 cwt, and during the past 5 years has preserved an average of about 7 274 000 cwt

In 1882-83 Indian commercial men calculated that on an average Scotland consumed over 18 400 bales (73 600 cwt) a week Of these Messrs Cox Brothers take 2 200, Messrs Gilroy & Sons 750, Messrs Malcolm, Ogilvie & Co, 650, Mr John Sharp 700 In England the weekly consumption is over 1 860 bales, the largest consumers being the Barrow Company, 600 In Ireland the total weekly

1911

C. 1911

CORCHORUS.

The Jute Fibre

EXPORTS.

consumption is about 730 bales, the largest firm consuming under 300 bales a week. Thus Great Britain requires over 21,000 bales or 84,000 cwt a week, or 4,200,000 cwt a year to keep her existing jute factories

consumption of 195,000 cwt. The Scotch power-loom alone consume 73,600 cwt. a week, or 3,710,000 cwt. a year. Although in some respects this estimate has been disturbed, it is relatively correct for the present year 1887-88.

1912

France requires 4,000 bales a week, its largest consumer, Saint Freres, requiring 700 bales; Germany requires 2,170 a week, of which the Brunswick Jute Spinning Company consume 770 bales; Belgium requires 845 bales a week; Austria, 580, Spain, 250; Holland, 400; Norway, 100. Taking annual figures for the whole of Europe it is found that Great Britain and the Continent of Europe require 1,800,000 bales a year, or 6,428,580 cwt. It may be here stated that as merchants adopt the calendar year, and Government the financial, e.g., from April to March, considerable difficulty has been experienced in comparing the Government Statistical Tables of Exports with those kindly supplied by one or two well known jute firms in Calcutta.

1913

Comparing with the above figures the 22 Indian factories at work in India in 1882-83, or 600,000 bales, that to keep these were required, a sum by America, Australia, and other foreign countries, viz., 600,000 bales, or 2,142,493 cwt, not included in the above calculation, the annual

Annual
Capital.
1914

Looking at the exportation of raw jute, of manufactured jute, and the home (Indian) consumption known to our commercial men, the statement that the jute trade is at least represented at the present date by an annual consumption of over 15,000,000 cwt. of raw jute does not seem to be far from correct. This is roughly equivalent to an annual turn over of capital equal to about 12-14 millions of pounds sterling as compared with the exports in 1828 of £62.

MANUFACTURES.
1915

THE MANUFACTURES OF JUTE AND THEIR EXPORTATION FROM INDIA.

... have sprung and an- started 13 to Cal- k Com- nional The o to 40 3 spin-

C. 1915

of European Commerce.

CORCHORUS.

dles, and they give employment to 29,660 men, 11,198 women, 5,113 young persons, and 3,044 children. The Madras private jute company employs about 878 persons. Thus, up to the present date, there are in all India 24 jute factories, which give employment to 49,015 persons and use up 2,869,088 cwt of jute. They are almost exclusively employed in the gunny bag or cloth trade, three only doing a small business in cordage, floor cloth, or other manufactures.

MANUFACTURES.

In 1870 there were in England 1,000,000 spindles, and in Ireland 1,000,000 spindles, and in India there

every individual factory. Judging from the published statistics of jute factories in Scotland during the year 1879, and comparing a fixed number of these with the Indian factories for the same year, we may, however, conclude that the Indian mill workman was inferior to the Scotch workman in the ratio of 3 to 7. That is to say, it requires 7 persons to work one loom in an Indian factory, against 3 workmen in a Scotch factory. This conclusion is arrived at by dividing the total number of persons employed in a factory by the number of looms. In the case of the Scotch factories, the average for all Scotch factories and the average for all Indian factories, of course this calculation is open to the objection that it does not take into account factories not manufacturing the same article. It may be accepted as giving some sort of comparison.

1916

FOREIGN TRADE IN MANUFACTURES.

Prior to 1857 the exports of Jute manufactures from India represented hand loom fabrics. In 1850 these were valued at £215,978, whereas the trade in raw jute was only £197,071. Fifteen years later the manufactured jute, exported to foreign countries, was valued at £18,27,983 (£18,27,983) and the raw jute at £75,06,690 (£75,06,690). In 1870-71 the exports were of manufactured jute £34,24,249 (£34,24,249) worth and of raw jute £2,57,75,526 (£2,57,75,526). But the revival in the exports of manufactured jute indicated by these figures, as also the partial decline of the foreign raw jute trade, was at once the death of the old hand-loom industry and the birth of the new power-loom. Ten years later (1880-81) the total exports of manufactured jute were valued at £1,13,06,716 (£1,13,06,716), of which the hand looms produced £2,69,553 (£2,69,553), and last year they were valued at £1,15,18,577 (£1,15,18,577), of which the hand-looms produced £89,220 (£89,220). These figures indicate unmistakably the growth of the Indian power loom foreign trade and the decline of the hand loom. In a further page some idea will be given of the extent of the home market for jute goods.

Foreign Trade in Manufactures. 1917

LOCAL OR HOME CONSUMPTION

Local Consumption. 1918

CORCHORUS

The Jute Fibre

MANUFACTURES
Home Consumption

third of the number actually manufactured. The following table will show the relations of the home consumption to the exports more clearly —

Statement of Home Consumption and Exports of GUNNIES from 1st January to 31st December 1882

1919

Burma	13 312 306	
Straits	9,153,233	
Bombay and Persian Gulf	20 001 303	
Madras and Malabar	1,064 848	
Coromandel Coast	3 609 950	
Ceylon	177,777	
Up-country by rail	11,351,000	
Used in the export trade of Calcutta	11,848,743	
Total of Home Consumption		77,519,164
Australia	11,372,387	
New Zealand	5 060 60	
Cape of Good Hope	706 308	
Mauritius	119 078	
Egypt	691 078	
America	20,554 51	
Hongkong (not Hessans)	413 700	
Great Britain	516 417	
Europe	90, 31	
Total of Foreign Exports		41,523 607
Grand Total of Home Consumption and Foreign Exports		119 047 771

The total number of gunny bags brought to and carried from Calcutta during the past three years may be here given and alongside of these the foreign exports —

	1884-85	1885-86	1886-87
Imports	18 196 002	20 6 6 541	23 596 492
Total Exports (to other provinces of India and to foreign countries)	137,870,318	127 084 964	124 997,225
Foreign exports only	82,779 207	63 760 546	64 572 157

1920

total production of gunny bags in Bengal was perhaps little more than 150 millions, of which 64½ millions were sent to foreign countries and 85½ millions used up in India. This may be accepted as representing the bags employed in the home, cotton, oil seed, rice, and wheat trade, and

225,347,418
interport
quantity
5,267,418
to there
per borne

C. 1920

Of European Commerce

CORCHORUS

Traffic of Bengal for 1887 states that 605,846 pieces were sent up-country by river "direct from the jute mills without passing the Port Commissioner's wharves" A piece of power-loom gunny is equal to 80 yards, of hand-loom, to 22 yards, so that this power-loom trade alone re-

MANUFACTURES.
Home Consumption

industry is conducted in Dinagepore, Purneah, Rungpore, Julpaiguri, and Tipperah, Julpaiguri turned out last year 2,336,660 and Rungpore 1,222,410 hand-loom made bags

CLASSIFICATION OF THE JUTE MANUFACTURES

The manufactures from *jute* or *pat* may be referred to three primary sections —

CLASSIFICATION OF MANUFACTURE.
1921

These three sections may each be referred to a number of sub-divisions, which for convenience may be arranged in two leading groups, *vis*, native and indigenous manufactures, "hand loom," and European or "power loom" manufactures, whether made in Europe or in India. We shall first enumerate the indigenous manufactures, since these bear on the history of the industry.

INDIGENOUS MANUFACTURES

Indigenous

Ind
beam
talking
of spin
poses
or gun
Hortic

ra, the
is said
tended

1st, *Thick cloth* used for making gunny bags. Of this there are three qualities, the best being known as *amrabati*. These correspond to the three qualities of hand-loom gunnies in commerce

CORDIA
fragrantissima

The Jute Fibre.

CLASSIFICA-
TION OF MA-
NUFACTURES

2nd, *Fine cloth*—This is generally known by the name of *mekli dhokra*, and is chiefly used as a cloth to sleep on, it is often beautifully striped blue or red

3rd *Coarse cloth*—This is largely used for making the sails of country boats (*gun*), and also for bags to hold large seeds or fruits

The following are the principal districts in Bengal where indigenous jute manufactures (hand-looms) may be said to exist to any considerable extent—Hugh, consuming about 1,20,000 maunds of jute a year, Dacca, 90,000, Rungpore, 50,000, Moorshedabad, 38,000; Malda, 25,000; Julpaiguri, Pubna, &c, smaller quantities

European
Manufac-
tures.
1923

EUROPEAN MANUFACTURES

Cloth made in Factories—Jute is now largely used in the manufacture of carpets, curtains, shirtings, and is also mixed with silk or used for imitating silk fabrics. It has been applied extensively as a substitute for hemp for this purpose the fibres are rendered soft and flexible by being sprinkled with water and oil, in the proportion of 20 tons of water and 2½ tons of train oil to 100 tons of jute. Sprinkled with this the jute is left for from 24 to 48 hours, when after being squeezed by rollers and heckled, the fibres become beautifully soft and minutely isolated, and thereby suited for a number of uses.

the
and

and other fibres were not adulterated with jute. In 1832 an enterprising Dundee manufacturer experimented once more on the fibre, and the result was that he was able to show that it might be used as a substitute for hemp. From that date jute gained rapidly in public favour. It is

and the fact is that the jute fibre is now used in a great number of ways.

1. — 2. — 3. — 4. — 5. — 6. — 7. — 8. — 9. — 10. — 11. — 12. — 13. — 14. — 15. — 16. — 17. — 18. — 19. — 20. — 21. — 22. — 23. — 24. — 25. — 26. — 27. — 28. — 29. — 30. — 31. — 32. — 33. — 34. — 35. — 36. — 37. — 38. — 39. — 40. — 41. — 42. — 43. — 44. — 45. — 46. — 47. — 48. — 49. — 50. — 51. — 52. — 53. — 54. — 55. — 56. — 57. — 58. — 59. — 60. — 61. — 62. — 63. — 64. — 65. — 66. — 67. — 68. — 69. — 70. — 71. — 72. — 73. — 74. — 75. — 76. — 77. — 78. — 79. — 80. — 81. — 82. — 83. — 84. — 85. — 86. — 87. — 88. — 89. — 90. — 91. — 92. — 93. — 94. — 95. — 96. — 97. — 98. — 99. — 100. — 101. — 102. — 103. — 104. — 105. — 106. — 107. — 108. — 109. — 110. — 111. — 112. — 113. — 114. — 115. — 116. — 117. — 118. — 119. — 120. — 121. — 122. — 123. — 124. — 125. — 126. — 127. — 128. — 129. — 130. — 131. — 132. — 133. — 134. — 135. — 136. — 137. — 138. — 139. — 140. — 141. — 142. — 143. — 144. — 145. — 146. — 147. — 148. — 149. — 150. — 151. — 152. — 153. — 154. — 155. — 156. — 157. — 158. — 159. — 160. — 161. — 162. — 163. — 164. — 165. — 166. — 167. — 168. — 169. — 170. — 171. — 172. — 173. — 174. — 175. — 176. — 177. — 178. — 179. — 180. — 181. — 182. — 183. — 184. — 185. — 186. — 187. — 188. — 189. — 190. — 191. — 192. — 193. — 194. — 195. — 196. — 197. — 198. — 199. — 200. — 201. — 202. — 203. — 204. — 205. — 206. — 207. — 208. — 209. — 210. — 211. — 212. — 213. — 214. — 215. — 216. — 217. — 218. — 219. — 220. — 221. — 222. — 223. — 224. — 225. — 226. — 227. — 228. — 229. — 230. — 231. — 232. — 233. — 234. — 235. — 236. — 237. — 238. — 239. — 240. — 241. — 242. — 243. — 244. — 245. — 246. — 247. — 248. — 249. — 250. — 251. — 252. — 253. — 254. — 255. — 256. — 257. — 258. — 259. — 260. — 261. — 262. — 263. — 264. — 265. — 266. — 267. — 268. — 269. — 270. — 271. — 272. — 273. — 274. — 275. — 276. — 277. — 278. — 279. — 280. — 281. — 282. — 283. — 284. — 285. — 286. — 287. — 288. — 289. — 290. — 291. — 292. — 293. — 294. — 295. — 296. — 297. — 298. — 299. — 300. — 301. — 302. — 303. — 304. — 305. — 306. — 307. — 308. — 309. — 310. — 311. — 312. — 313. — 314. — 315. — 316. — 317. — 318. — 319. — 320. — 321. — 322. — 323. — 324. — 325. — 326. — 327. — 328. — 329. — 330. — 331. — 332. — 333. — 334. — 335. — 336. — 337. — 338. — 339. — 340. — 341. — 342. — 343. — 344. — 345. — 346. — 347. — 348. — 349. — 350. — 351. — 352. — 353. — 354. — 355. — 356. — 357. — 358. — 359. — 360. — 361. — 362. — 363. — 364. — 365. — 366. — 367. — 368. — 369. — 370. — 371. — 372. — 373. — 374. — 375. — 376. — 377. — 378. — 379. — 380. — 381. — 382. — 383. — 384. — 385. — 386. — 387. — 388. — 389. — 390. — 391. — 392. — 393. — 394. — 395. — 396. — 397. — 398. — 399. — 400. — 401. — 402. — 403. — 404. — 405. — 406. — 407. — 408. — 409. — 410. — 411. — 412. — 413. — 414. — 415. — 416. — 417. — 418. — 419. — 420. — 421. — 422. — 423. — 424. — 425. — 426. — 427. — 428. — 429. — 430. — 431. — 432. — 433. — 434. — 435. — 436. — 437. — 438. — 439. — 440. — 441. — 442. — 443. — 444. — 445. — 446. — 447. — 448. — 449. — 450. — 451. — 452. — 453. — 454. — 455. — 456. — 457. — 458. — 459. — 460. — 461. — 462. — 463. — 464. — 465. — 466. — 467. — 468. — 469. — 470. — 471. — 472. — 473. — 474. — 475. — 476. — 477. — 478. — 479. — 480. — 481. — 482. — 483. — 484. — 485. — 486. — 487. — 488. — 489. — 490. — 491. — 492. — 493. — 494. — 495. — 496. — 497. — 498. — 499. — 500. — 501. — 502. — 503. — 504. — 505. — 506. — 507. — 508. — 509. — 510. — 511. — 512. — 513. — 514. — 515. — 516. — 517. — 518. — 519. — 520. — 521. — 522. — 523. — 524. — 525. — 526. — 527. — 528. — 529. — 530. — 531. — 532. — 533. — 534. — 535. — 536. — 537. — 538. — 539. — 540. — 541. — 542. — 543. — 544. — 545. — 546. — 547. — 548. — 549. — 550. — 551. — 552. — 553. — 554. — 555. — 556. — 557. — 558. — 559. — 560. — 561. — 562. — 563. — 564. — 565. — 566. — 567. — 568. — 569. — 570. — 571. — 572. — 573. — 574. — 575. — 576. — 577. — 578. — 579. — 580. — 581. — 582. — 583. — 584. — 585. — 586. — 587. — 588. — 589. — 590. — 591. — 592. — 593. — 594. — 595. — 596. — 597. — 598. — 599. — 600. — 601. — 602. — 603. — 604. — 605. — 606. — 607. — 608. — 609. — 610. — 611. — 612. — 613. — 614. — 615. — 616. — 617. — 618. — 619. — 620. — 621. — 622. — 623. — 624. — 625. — 626. — 627. — 628. — 629. — 630. — 631. — 632. — 633. — 634. — 635. — 636. — 637. — 638. — 639. — 640. — 641. — 642. — 643. — 644. — 645. — 646. — 647. — 648. — 649. — 650. — 651. — 652. — 653. — 654. — 655. — 656. — 657. — 658. — 659. — 660. — 661. — 662. — 663. — 664. — 665. — 666. — 667. — 668. — 669. — 670. — 671. — 672. — 673. — 674. — 675. — 676. — 677. — 678. — 679. — 680. — 681. — 682. — 683. — 684. — 685. — 686. — 687. — 688. — 689. — 690. — 691. — 692. — 693. — 694. — 695. — 696. — 697. — 698. — 699. — 700. — 701. — 702. — 703. — 704. — 705. — 706. — 707. — 708. — 709. — 710. — 711. — 712. — 713. — 714. — 715. — 716. — 717. — 718. — 719. — 720. — 721. — 722. — 723. — 724. — 725. — 726. — 727. — 728. — 729. — 730. — 731. — 732. — 733. — 734. — 735. — 736. — 737. — 738. — 739. — 740. — 741. — 742. — 743. — 744. — 745. — 746. — 747. — 748. — 749. — 750. — 751. — 752. — 753. — 754. — 755. — 756. — 757. — 758. — 759. — 760. — 761. — 762. — 763. — 764. — 765. — 766. — 767. — 768. — 769. — 770. — 771. — 772. — 773. — 774. — 775. — 776. — 777. — 778. — 779. — 780. — 781. — 782. — 783. — 784. — 785. — 786. — 787. — 788. — 789. — 790. — 791. — 792. — 793. — 794. — 795. — 796. — 797. — 798. — 799. — 800. — 801. — 802. — 803. — 804. — 805. — 806. — 807. — 808. — 809. — 810. — 811. — 812. — 813. — 814. — 815. — 816. — 817. — 818. — 819. — 820. — 821. — 822. — 823. — 824. — 825. — 826. — 827. — 828. — 829. — 830. — 831. — 832. — 833. — 834. — 835. — 836. — 837. — 838. — 839. — 840. — 841. — 842. — 843. — 844. — 845. — 846. — 847. — 848. — 849. — 850. — 851. — 852. — 853. — 854. — 855. — 856. — 857. — 858. — 859. — 860. — 861. — 862. — 863. — 864. — 865. — 866. — 867. — 868. — 869. — 870. — 871. — 872. — 873. — 874. — 875. — 876. — 877. — 878. — 879. — 880. — 881. — 882. — 883. — 884. — 885. — 886. — 887. — 888. — 889. — 890. — 891. — 892. — 893. — 894. — 895. — 896. — 897. — 898. — 899. — 900. — 901. — 902. — 903. — 904. — 905. — 906. — 907. — 908. — 909. — 910. — 911. — 912. — 913. — 914. — 915. — 916. — 917. — 918. — 919. — 920. — 921. — 922. — 923. — 924. — 925. — 926. — 927. — 928. — 929. — 930. — 931. — 932. — 933. — 934. — 935. — 936. — 937. — 938. — 939. — 940. — 941. — 942. — 943. — 944. — 945. — 946. — 947. — 948. — 949. — 950. — 951. — 952. — 953. — 954. — 955. — 956. — 957. — 958. — 959. — 960. — 961. — 962. — 963. — 964. — 965. — 966. — 967. — 968. — 969. — 970. — 971. — 972. — 973. — 974. — 975. — 976. — 977. — 978. — 979. — 980. — 981. — 982. — 983. — 984. — 985. — 986. — 987. — 988. — 989. — 990. — 991. — 992. — 993. — 994. — 995. — 996. — 997. — 998. — 999. — 1000. — 1001. — 1002. — 1003. — 1004. — 1005. — 1006. — 1007. — 1008. — 1009. — 1010. — 1011. — 1012. — 1013. — 1014. — 1015. — 1016. — 1017. — 1018. — 1019. — 1020. — 1021. — 1022. — 1023. — 1024. — 1025. — 1026. — 1027. — 1028. — 1029. — 1030. — 1031. — 1032. — 1033. — 1034. — 1035. — 1036. — 1037. — 1038. — 1039. — 1040. — 1041. — 1042. — 1043. — 1044. — 1045. — 1046. — 1047. — 1048. — 1049. — 1050. — 1051. — 1052. — 1053. — 1054. — 1055. — 1056. — 1057. — 1058. — 1059. — 1060. — 1061. — 1062. — 1063. — 1064. — 1065. — 1066. — 1067. — 1068. — 1069. — 1070. — 1071. — 1072. — 1073. — 1074. — 1075. — 1076. — 1077. — 1078. — 1079. — 1080. — 1081. — 1082. — 1083. — 1084. — 1085. — 1086. — 1087. — 1088. — 1089. — 1090. — 1091. — 1092. — 1093. — 1094. — 1095. — 1096. — 1097. — 1098. — 1099. — 1100. — 1101. — 1102. — 1103. — 1104. — 1105. — 1106. — 1107. — 1108. — 1109. — 1110. — 1111. — 1112. — 1113. — 1114. — 1115. — 1116. — 1117. — 1118. — 1119. — 1120. — 1121. — 1122. — 1123. — 1124. — 1125. — 1126. — 1127. — 1128. — 1129. — 1130. — 1131. — 1132. — 1133. — 1134. — 1135. — 1136. — 1137. — 1138. — 1139. — 1140. — 1141. — 1142. — 1143. — 1144. — 1145. — 1146. — 1147. — 1148. — 1149. — 1150. — 1151. — 1152. — 1153. — 1154. — 1155. — 1156. — 1157. — 1158. — 1159. — 1160. — 1161. — 1162. — 1163. — 1164. — 1165. — 1166. — 1167. — 1168. — 1169. — 1170. — 1171. — 1172. — 1173. — 1174. — 1175. — 1176. — 1177. — 1178. — 1179. — 1180. — 1181. — 1182. — 1183. — 1184. — 1185. — 1186. — 1187. — 1188. — 1189. — 1190. — 1191. — 1192. — 1193. — 1194. — 1195. — 1196. — 1197. — 1198. — 1199. — 1200. — 1201. — 1202. — 1203. — 1204. — 1205. — 1206. — 1207. — 1208. — 1209. — 1210. — 1211. — 1212. — 1213. — 1214. — 1215. — 1216. — 1217. — 1218. — 1219. — 1220. — 1221. — 1222. — 1223. — 1224. — 1225. — 1226. — 1227. — 1228. — 1229. — 1230. — 1231. — 1232. — 1233. — 1234. — 1235. — 1236. — 1237. — 1238. — 1239. — 1240. — 1241. — 1242. — 1243. — 1244. — 1245. — 1246. — 1247. — 1248. — 1249. — 1250. — 1251. — 1252. — 1253. — 1254. — 1255. — 1256. — 1257. — 1258. — 1259. — 1260. — 1261. — 1262. — 1263. — 1264. — 1265. — 1266. — 1267. — 1268. — 1269. — 1270. — 1271. — 1272. — 1273. — 1274. — 1275. — 1276. — 1277. — 1278. — 1279. — 1280. — 1281. — 1282. — 1283. — 1284. — 1285. — 1286. — 1287. — 1288. — 1289. — 1290. — 1291. — 1292. — 1293. — 1294. — 1295. — 1296. — 1297. — 1298. — 1299. — 1300. — 1301. — 1302. — 1303. — 1304. — 1305. — 1306. — 1307. — 1308. — 1309. — 1310. — 1311. — 1312. — 1313. — 1314. — 1315. — 1316. — 1317. — 1318. — 1319. — 1320. — 1321. — 1322. — 1323. — 1324. — 1325. — 1326. — 1327. — 1328. — 1329. — 1330. — 1331. — 1332. — 1333. — 1334. — 1335. — 1336. — 1337. — 1338. — 1339. — 1340. — 1341. — 1342. — 1343. — 1344. — 1345. — 1346. — 1347. — 1348. — 1349. — 1350. — 1351. — 1352. — 1353. — 1354. — 1355. — 1356. — 1357. — 1358. — 1359. — 1360. — 1361. — 1362. — 1363. — 1364. — 1365. — 1366. — 1367. — 1368. — 1369. — 1370. — 1371. — 1372. — 1373. — 1374. — 1375. — 1376. — 1377. — 1378. — 1379. — 1380. — 1381. — 1382. — 1383. — 1384. — 1385. — 1386. — 1387. — 1388. — 1389. — 1390. — 1391. — 1392. — 1393. — 1394. — 1395. — 1396. — 1397. — 1398. — 1399. — 1400. — 1401. — 1402. — 1403. — 1404. — 1405. — 1406. — 1407. — 1408. — 1409. — 1410. — 1411. — 1412. — 1413. — 1414. — 1415. — 1416. — 1417. — 1418. — 1419. — 1420. — 1421. — 1422. — 1423. — 1424. — 1425. — 1426. — 1427. — 1428. — 1429. — 1430. — 1431. — 1432. — 1433. — 1434. — 1435. — 1436. — 1437. — 1438. — 1439. — 1440. — 1441. — 1442. — 1443. — 1444. — 1445. — 1446. — 1447. — 1448. — 1449. — 1450. — 1451. — 1452. — 1453. — 1454. — 1455. — 1456. — 1457. — 1458. — 1459. — 1460. — 1461. — 1462. — 1463. — 1464. — 1465. — 1466. — 1467. — 1468. — 1469. — 1470. — 1471. — 1472. — 1473. — 1474. — 1475. — 1476. — 1477. — 1478. — 1479. — 1480. — 1481. — 1482. — 1483. — 1484. — 1485. — 1486. — 1487. — 1488. — 1489. — 1490. — 1491. — 1492. — 1493. — 1494. — 1495. — 1496. — 1497. — 1498. — 1499. — 1500. — 1501. — 1502. — 1503. — 1504. — 1505. — 1506. — 1507. — 1508. — 1509. — 1510. — 1511. — 1512. — 1513. — 1514. — 1515. — 1516. — 1517. — 1518. — 1519. — 1520. — 1521. — 1522. — 1523. — 1524. — 1525. — 1526. — 1527. — 1528. — 1529. — 1530. — 1531. — 1532. — 1533. — 1534. — 1535. — 1536. — 1537. — 1538. — 1539. — 1540. — 1541. — 1542. — 1543. — 1544. — 1545. — 1546. — 1547. — 1548. — 1549. — 1550. — 1551. — 1552. — 1553. — 1554. — 1555. — 1556. — 1557. — 1558. — 1559. — 1560. — 1561. — 1562. — 1563. — 1564. — 1565. — 1566. — 1567. — 1568. — 1569. — 1570. — 1571. — 1572. — 1573. — 1574. — 1575. — 1576. — 1577. — 1578. — 1579. — 1580. — 1581. — 1582. — 1583. — 1584. — 1585. — 1586. — 1587. — 1588. — 1589. — 1590. — 1591. — 1592. — 1593. — 1594. — 1595. — 1596. — 1597. — 1598. — 1599. — 1600. — 1601. — 1602. — 1603. — 1604. — 1605. — 1606. — 1607. — 1608. — 1609. — 1610. — 1611. — 1612. — 1613. — 1614. — 1615. — 1616. — 1617. — 1618. — 1619. — 1620. — 1621. — 1622. — 1623. — 1624. — 1625. — 1626. — 1627. — 1628. — 1629. — 1630. — 1631. — 1632. — 1633. — 1634. — 1635. — 1636. — 1637. — 1638. — 1639. — 1640. — 1641. — 1642. — 1643. — 1644. — 1645. — 1646. — 1647. — 1648. — 1649. — 1650. — 1651. — 1652. — 1653. — 1654. — 1655. — 1656. — 1657. — 1658. — 1659. — 1660. — 1661. — 1662. — 1663. — 1664. — 1665. — 1666. — 1667. — 1668. — 1669. — 1670. — 1671. — 1672. — 1673. — 1674. — 1675. — 1676. — 1677. — 1678. — 1679. — 1680. — 1681. — 1682. — 1683. — 1684. — 1685. — 1686. — 1687. — 1688. — 1689. — 1690. — 1691. — 1692. — 1693. — 1694. — 1695. — 1696. — 1697. — 1698. — 1699. — 1700. — 1701. — 1702. — 1703. — 1704. — 1705. — 1706. — 1707. — 1708. — 1709. — 1710. — 1711. — 1712. — 1713. — 1714. — 1715. — 1716. — 1717. — 1718. — 1719. — 1720. — 1721. — 1722. — 1723. — 1724. — 1725. — 1726. — 1727. — 1728. — 1729. — 1730. — 1731. — 1732. — 1733. — 1734. — 1735. — 1736. — 1737. — 1738. — 1739. — 1740. — 1741. — 1742. — 1743. — 1744. — 1745. — 1746. — 1747. — 1748. — 1749. — 1750. — 1751. — 1752. — 1753. — 1754. — 1755. — 1756. — 1757. — 1758. — 1759. — 1760. — 1761. — 1762. — 1763. — 1764. — 1765. — 1766. — 1767. — 1768. — 1769. — 1770. — 1771. — 1772. — 1773. — 1774. — 1775. — 1776. — 1777. — 1778. — 1779. — 1780. — 1781. — 1782. — 1783. — 1784. — 1785. — 1786. — 1787

CORDIA
Myxa.

The Sebestea Fruit

Pr, 169, *Sind Gas*, 559, *Bomb Gas*, XV, 66; XIII, 23, VII, 42,
Ind For, VII, 82, IX, 216, *Smith, Dic*, 374, *Kew Off Guide to the*
Mus of Ec. Bot, 98.

Range
 0 feet,
 , Cen-
 tral, and South India

Mr. Atkinson says it is cultivated throughout the plains; is wild
 along the Himalayas, and flowers in March and April, the fruit ripening
 in May to July

GUM
 1932
 DYE.
 1933

Gum.—Said to yield a gum in Rájputána.

used in
 juice of

FIBRE
 1934

caulk-

MEDICINE.
 1935

FOOD
 Fruit.
 1936

The ripe fruits are
 of a drupe, the pulp

"The fruit when ripe is eaten by the natives and also pickled"
 the smell of the nuts when cut is heavy and disagreeable. the taste of

that the fruit,
 e natives it is
 Atkinson says
 wed Dymock
 f 1877-78 in the

FODDER,
 1937
 TIMBER.
 1938

Nasik District

Fodder.—The leaves are given to cattle as fodder. The lac insect
 feeds on this plant (*Indian Forester*, VIII, 82)

Structure of the Wood.—Wood grey, moderately hard. In spite of
 its softness, it is fairly strong, and seasons well, but is readily attacked
 by insects. It is used for boat-building, well-curbs, gun-stocks, and agri-

The Sebesten Fruit.

CORDIA
Rothii.

cultural implements, in Bengal for canoes. It might be tried for tea-boxes. It makes an excellent fuel. In a report of Chanduka in Sind (1847), it is stated that "the wood is used for sword sheaths." The Santals regard the wood as specially useful for yokes, as it does not

DOMESTIC.
1939

North-Western Provinces that the leaves are used as plates, and that the viscid pulp of the fruit is used as bird-lime

Cordia obliqua, Willd.

1940

This is the larger **SEBESTEN** according to Stocks, Dymock, Birdwood, &c., **C. Myxa** being the lesser, but the vernacular names given would imply the reverse to be the case

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References—Roxb, *Fl Ind*, Ed C B C, 198, Brandis, *For Fl*, 335, (in part), *Thametes*, *En Ceylon Pt*, 213; *Dals & Gids Bomb Fl*, 173, *Sind Gas*, 603, *Bomb Gas*, V, 27, Dymock, *Mat Med W Ind*, 2nd Ed, p 579; Atkinson, *Hum Dist*, 733, Birdwood, *Bomb Pr*, 53, 169, Smith, *Dic*, 374

Habitat—Found in Western India (especially Guzerat), from the

MEDICINE.
1941

.....

Special Opinion—"The fruit in its raw state contains a gum used

beneficially as a demulcent" *Id* & *C*.....

FOOD
1942

.....

TIMBER.
1943

C. Rothii, *Rom & Schult*, *Fl Br Ind*, IV, 138

1944

CORDIA
vestita.

Cordage and Ropes

ones of North-West, Central, and
Stocks says that it is sometimes

GUM
1945

Yields a gum which is reported to be prepared at Coimbatore. In the Bombay Gazetteer of Baroda District, it is stated "fruit eaten by the poor and pickled, as is the gum which exudes from it."

FIBRE.
1946

MEDICINE
1947
FOOD.
1948
TIMBER,
1949

Medicine—The decoction of the bark possesses astringent properties,

and is also pickled

Used for fuel, elements. Baden Powell remarks that the wood is tough and is employed for making carriage poles. Stocks says the wood of the *lyar* is much used in Sind.

1950

Cordia vestita, Hook f & Th, Fl Br Ind, IV, 139

Syn—*GNAION VESTITUM*, DC

Vern—*Kumbli*, *Karik* Pb, *Kum* *paiban*, *pin*, *inddê*, *chinta*, *ajaria*, *bairula*, *berula*, *HIND*

References—Brandis, For Fl 338; Gamble, Man Timb, 271; Atkinson, Econ Prot, N W P, V, 81; Baden Powell, Fl Br, 575

Habitat.—A small deciduous tree of the sub-Himalayan tract, from the Jhelum to the Sarda River and Oudh

MEDICINE.
1951

Medicine—Fruit used similarly to the other species, and when ripe is an article of food, it is considered better than that of *C Myxa*. Mr Atkinson states the flowers appear in spring and the fruit ripens in the rains. He remarks that the fruit is full of a gelatinous pulp which is commonly eaten and considered refreshing

TIMBER.
1952

Structure of the Wood—The wood is very similar in appearance to that of *C Macleodii*, except that the concentric lines are occasionally interrupted, it is strong and is used for wheel and well-work.

1953

CORDAGE AND ROPES

Many fibres are used for this purpose, in fact, the natives of India are never at a loss when in the forests to find a plant the bark of which will serve the purpose of a string or rope. The majority of such plants are more or less used locally in the preparation of ropes or cords, a considerable number are of commercial importance. Against the names in the following list have been placed one or in some cases two * to indicate the fibre-yielding plants frequently used for cordage, or the fibres which hold a position of commercial importance (* indicating greater importance than *) —

* *Abroma augusta*
Abutilon asiaticum
A. *Avidennae*
** *Agave americana*
Alnus nuda (for rope)
Artocarpus Lakoocha
Arundo K

Bauhinia angulata
B. racemosa
* *B. Vahlia*
Bixa Orellana
Boehmeria macrophylla (fishing nets)
** *B. niver*
Bombax malabaricum

C. 1953

Coriander.

CORIARIA
nepalensis.

been indicated by the formula $C_{10}H_{12}O$, and is therefore isomeric with borneol. By abstraction of the elements of water (by means of phosphoric anhydride) this is converted into an oil having an offensive odour

being submitted to distillation" (Professor Warden, Calcutta).

Medicine.—The medicinal properties attributed to this plant are many,—namely, carminative, refrigerant, diuretic, tonic, and aphrodisiac. The dried fruit and the volatile oil are used as an aromatic stimulant in

MEDICINE.
1956

Greeks."

with good results (Sinagwan Dass (2nd), Assistant Surgeon, General Hospital, Rawal Pindi, Panjab) "The roasted fruit is generally used" (Dr. Bensley, Civil Surgeon, Rajshahye). "A strong decoction of the seeds with milk an

(D R Thomson, M
aromatic, stimulant
Moorshedabad)

Assistant Surgeon, "useful in colics of children, powder of fried seeds" (Shub Chunder Bhattacharya, Assistant Surgeon, In Civil Medical Charge Chanda, Central Provinces).

Food—Eaten by the natives as a vegetable. The seeds are universally used as a condiment, and form one of the ingredients in curry.

They are also employed in confectionery, and for flavouring spirits.

FOOD
1957

CORIARIA, Linn ; Gen. Pl, I, 429

Coriaria nepalensis, Wall. ; Fl. Br. Ind., II, 44; CORIARIE.

1958

CORIARIA
nepalensis.

Coriaria.

Sind Pl., 36; O'Shaughnessy, Beng. Dispens., 270; Flück. & Hand. Pharmacog., 221; U. S. Dispens., 15th Ed., 1622; Baden Powell, Fl. Pr., 336, 575; Atkinson, Him. Dist., 749; Balfour, Cyclop., 813; Treasury of Bot., 331.

Habitat.—A deciduous shrub or small tree of the outer Himalaya

West and

Yunan

rich, but in

have been

tern Prov-

near this station, Simla, the capital of Hindustan, being in a like manner the vernacular name for *Rumex acetosa*.

Tan.—All parts of the plant are rich in astringent acids which might be used for tanning or for dyeing.

Food and Fodder.—"The branches are browsed by sheep. The fruit is first

as a powerful poison when given in large doses. The seeds are stated to sometimes produce symptoms like tetanus.

species in French gardens, and its leaves are often employed as a black dye, and were at one time extensively used as an adulterant in Senna. Much has been written of the poisonous properties of the New Zealand species, the Toot-poison—*Coriaria ruscifolia*. Mr. Lander Lindsay gives an elaborate account of the properties of that plant in the British and Foreign Medico-Chirurgical Review (1865, p. 153, and 1868 p. 463). M. Riban attributes the poison of the fruit to an active principle, which he has called coriamyrtin, the composition of which is represented by the formula $C_{30}H_{36}O_{10}$ a substance ranked with the glucosides.

The inhabitants of New Zealand extract an intoxicating beverage from the pulp of the fruit.

brief note
resinous
cat, after
wever, the
by cattle

artwood
t be used
ood, but

* References to the Mediterranean or New Zealand species

TAN.
1959
FOOD and
FODDER
1960
MEDICINE.
1961

TIMBER.
1962

The Cornus

CORNUS
macrophylla.

corn—a term often specifically applied to *Avena sativa*, but generically given to all cultivated grasses which yield farinaceous grains, such as Wheat, Maize, Barley, Oats, &c. When ground, Corn is designated flour or meal. See *Avena* Vol. I, 1631.

corn-flag, see *Ins*

corn-Indian, see *Zea Mays*.

corn-silk—the silky stigmata of *Zea Mays*, from which a medicinal preparation is made. See *Zea*

CORNUS, Linn.; *Gen Pl.*, I, 950

[t 122; CORNACEÆ

Cornus capitata, Wall; *Fl Br Ind*, Vol. II, 745, Wight, III,

Syn.—*BENTHAMIA FRAGIFERA*, Lindl

Vern.—*Thamnial*, *tharbal*, *tharwar*, *thesi*, *bamaur*, *bamora*, HIND.,
Tumbuk, LEICHA, *Tharwar*, *thesi*, PB, *Bamaura*, KUMAON

References.—*Brandis*, *For Fl*, 253, *Gamble*, *Man Timb*, 212, *Stewart*,
Pb Pl, 111; *Ainslie*, *Mat Ind*, II, 454, * *O Shaughnessy*, *Beng*
Dispens, 375, *O Shaughnessy*, *Beng Pharm*, 40, *Atkinson*, *Econ*
Prod, V, 75, *Treasury of Bot*, 333

Habitat.—A small deciduous tree of the Himalaya, from the Beas to Bhutan, between 3,500 and 8,000 feet met with also in Khasia hills, where it is glabrous or nearly so

The Himalaya, in April and May, often becomes almost yellow from the conspicuous cream coloured bracts which surround the flower-heads of this plant. In the North-West Himalaya, it is particularly abundant in the lower hot valleys growing along with the berberry

Food—Dr Stewart says that the ripe fruit is sweetish, and is apparently made into a preserve and eaten by the natives. It resembles a strawberry somewhat in external appearance, and ripens in October.

Structure of the Wood—Whitish, with reddish-brown heartwood, warps in seasoning, very hard, close-grained, used only for firewood,

C. macrophylla, Wall, *Fl Br Ind*, Vol II, 744

Econ Prod, V, 75

Habitat—A tree, 40 to 50 feet high, frequent in the Himalaya, from the Indus to Bhutan, between 3,000 and 8,000 feet, found by the winter in Manipur. It flowers in May and June

Oil—A species closely allied to the *C. sanguinea*, and may, like that species, be found to afford an oil from its fruits

Food and Fodder—Goats feed on its leaves, and the natives eat the fruit

Structure of the Wood—Pinkish-white, hard, close-grained, warps badly, and has an unpleasant scent, yields good gunpowder charcoal

OIL.
1970
FODDER
1971
WOOD
1972

* *Cornus florida*, alluded to as having a medicinal bark, very similar in its properties to the bark of *Melia Azadirachta*

C. 1972

CORUNDUM.

Emery Stone

1973 *Cornus oblonga*, Wall; *Fl. Br. Ind.*, II, 744

Veru.—Kagski, SUTLEJ; Dað, KUNAWAR, Kasmol, batar, ban-batir,
hald. HIND.

References—*Brandis, For Fl*, 353; *Kurr, For Fl*, 1, 545; *Gamble, Man Timb*, 212; *Stewart, Pb Pl*, 111; *O'Shaughnessy, Beng Dispens*, 375; *O'Shaughnessy, Beng. Pharm*, 39; *Baden Powell, Pb. Pr.*, 576.

Habitat—A small tree of the outer Himālaya, from the Indus to Bhutān, between 3,000 and 6,000 feet, met with also in the Martaban Hills, Burma, between 4,000 and 7,000 feet (*Kurs*).

Structure of the Wood.—Pinkish-white, hard, even-grained; warps and has an unpleasant scent.

WOOD.
1074

1975 | *C. sanguinea*, Linn ; *Fl. Br. Ind.*, II., 744.

THE DOGWOOD, DOGBERRY, or HOUNDS' TREE, a name given in consequence of a decoction of the bark having been formerly used for washing mangy dogs; sometimes also called the **CORVEL TREE**.

References—Brandis, *For Fl*, 253, Gamble, *Man Timb*, 212; O'Shaughnessy, *Beng Dispens*, 375, O'Shaughnessy, *Beng Pharm*, 39, Cooke, *Oils and Oulseeds*, 38, Smith, *Dic*, 156.

Habitat—A shrub or small tree found in Europe, Siberia, and in Kashmir, in the last-mentioned country at 7,000 feet in altitude. The writer found the plant also growing near a village in Chumba State, but it may there have been only cultivated. The young shoots are red in spring, and the leaves turn of that colour in autumn, hence the specific

OIL.
1976

black
imps
yru
seful
ould

WOOD.
1977

[illegible]

Coromandel or Calamander-Wood, see *Diospyros guineia* and
D. hirsuta

Coroxylon Griffithii, a misprint which appears in *Balfour's Cyclopædia* and in the writings of other authors. See **Caroxylon** and also **Haloxylon**.

Corrosive sublimate, see Mercury.

1978 Corundum.

ENERGYSTONE, *Eng*; L'ENERI, *Fr.*; SCHMERGEL, *Germ.*; SMERIG-
LIO, *Ital*

Vern.—*Amrind. Hind* : *Samada, Guj*

Veru.—*Amund, Hind; Samada, Guj*

C. 1978

Corundum or Emery Stone.

CORYDALIS
Govaniana.

far between The finest quality of Corundum is perhaps that obtained

Punyghie in the Bellary district, North Arcot district, Kistna and Godavari, and Hyderabad territory, and on into the Central Provinces

1979

Coimbatore, p 23) Emery is said to be largely exported to Bombay (Madras Manual of Administration, II, 38, Settlement Report of Upper Godavery Dist., 42, Balfour, Cyclopaedia of India, 816)

CORYDALIS, Linn, Gen Pl, I, 55

[Ill, f 16, f 2, FUMARIACEAE

Corydalis Govaniana, Wall, Fl Br Ind, Vol I, 124; Royle,

1980

Vern.—*Bhutkis, bhutken*, HIND & BENO; *Bhutakesi*, SANS (Dutt, Mat Med Hind)

Some doubt seems to prevail as to the source of the *budhes* of the drug shops Stewart says that in the Ravi basin that name is given to the root of a *Ptychotis*

References—Stewart, Pb Pl, 10, 109 Pharm Ind, 23, O'Shaughnessy, Beng Dispens, 185, U C Dutt, Mat Med Hind, 294

Habitat.—A small herbaceous plant, found in the North-West Himá-

MEDICINE.

Root.

1981

Corydalis.

1982

in solution to dogs without inconvenience"

"The *Corydalis tuberosa* and *fabacea* in Europe have a bitter acid root, usually sold as *ARISTOLOCHIA* root, and used chiefly as an external

C. 1982

CORYLUS
Avellana.

The European Hazel.

1983

application to indolent tumors. The small quantity in our possession alone prevented the *Corydalis* and its salts from being extensively tried in the treatment of ague. The chemical properties of the salts are closely analogous to those of morphia and anarcotine, an interesting fact, as it strengthens the resemblance already detected by botanists between the PAPAVRACEÆ and FUMARACEÆ. It might be added also that the relation of these orders to the RANUNCULACEÆ, through *Coptis* and to BERBERIDEÆ through the berberry or *rassou* extract, is similarly borne out by their chemical and medicinal properties. (See the next species and compare with the remarks under *Coptis Teeta*, C. No 1789, and *Berberis Lycium*, B. No. 460; also *Picrothiza Karroa*).

The Turkey-corn or Turkey-pea (*Corydalis formosa*) contains in its roots, according to Mr. W. T. Werzell, the alkaloid *corydaline*, formic acid, bitter extractive, an acrid resin with volatile oil, a tasteless resin, and

MEDICINE.
1984

the alkaloid (*Corydaline*) found in the European species—*Corydalis tuberosus*.

The roots of all these plants are supposed to be tonic, diuretic, and alterative, and are prescribed in syphilitic, scrofulous, and cutaneous affections, in the dose of from 10 to 30 grains. The drug is also often used in the form of a decoction or tincture.

Corydalis ramosa, Wall, Fl Br Ind, I, 125.

Dr. Aitchison, in his *Flora of the Kuram Valley* (Linnæa in Soc Jour, N.Y., page 145), says that in Kuram this common Himalayan scrambling annual is employed medicinally by the natives in the treatment of eye diseases, like all other plants with yellow sap. It is there called *mamiran*. It would be interesting to know if this plant is used medicinally in other parts of the Himalaya, but these properties are not attributed to it in Kulu, where the plant is abundant. (See remarks under the preceding species and compare with the account of *Coptis Teeta* C. No 1789).

CORYLUS, Tourn, Gen Pl, III., 406.

1985

Corylus Avellana, Linn, CUPULIFERÆ.

THE EUROPEAN HAZEL.

VERN.—*Findak*, Lindak, Hind, PERS., *Chagost*, PERS.

References.—*Brandis For Fl*, 424, *Gamble, Man Timb* 320; *O'Shaughnessy, Beng Dispens.*, 609, *U. S Dispens.*, 15th Ed., 57; *Baker Powell, Pb Pr*, 218, 385.

MEDICINE
Nuts
1986
FOOD
Nuts.
1987

C. 1987

... in the Caucasus
on the
"olive"
... semi-

... It is found
... and sold in the
Upper and Central

The Fan Palm of South India.

CORYPHA
umbraculifera.

Corylus Colurna, Linn

1988

Syn — C LACERA, Wall

Habitat — A moderate sized tree of the North-West Himalaya, be-
appear in March and April, and
bear every third year, and yield
(Atkinson).

OIL.
1989

mention is however, made
although the plant is suffic-
much so as to bestrew the ground for miles with the nuts

Medicine.—The nuts are not uncommon in drug-sellers' shops, being
considered tonic

MEDICINE.
Nuts
1990
FOOD
Nuts
1991

Food.—The nuts are smaller than the European variety, but are
the various
anistan and
cognised by
It is thus
rom a culti-
vated superior stock of C Colurna. As seen in the forests in the Simla
district, the actual nuts are small and rarely mature their kernels, but
they are encased in a large coarse outer coat and form large succulent
heads

Structure of the Wood — Pinkish white, moderately hard. It is only
used locally, but it is well grained and does not warp, and deserves to be
better known, especially as many specimens shew a fine shining grain
resembling Bird's eye Maple

WOOD
1992

C. ferox, Wall; Gamble, Man Timb, 390

Vern — CURRI, NEPAL, Langura, BHUTIA

Habitat — A small tree of Nepal and Sikkim, 8,000 to 10,000 feet

Food — The fruit is covered with prickly cup, the kernel is edible

Structure of the Wood — Pinkish white, moderately hard, even-
grained

FOOD
Nuts.
1993
WOOD
1994

CORYPHA, Linn, Gen. Pl., III, 922

Corypha umbraculifera, Linn; PALMÆ

THE TALIPOT PALM OF CEYLON AND THE FAN PALM OF SOUTH
INDIA

Vern — T
panai,
Bajar

1995

59 Voigt, Hort Sub
Fl Burm., II, 524,
Bomb Fl., Supp., 63,
74, t 8, Sw Walter

C. 1995

CORYPHA
umbraculifera.

The Fan Palm of South India.

Elliot, Flora Andhrica, 169, Madras, Man Admin, 27, Mooden Sheriff, Supp Pharm Ind, 116, Drury, U Pl, 159, Royle, Fib Pl, 98; Kew Offl Guide to the Mus of Ec Bot, 71; Kew Offl Guide to Bot Gardens and Arboretum, 33

Habitat.—A large tree of Ceylon and the Malabar Coast, cultivated in Bengal and Burma. But Roxburgh says it is "a native of Bengal,"

misleading.

FIBRE
Leaves.
1996

Fibre—The leaves are made into fans, mats, and umbrellas, and are

Fibre-bundle.
1997

Paper (olas).
1998

employed, the leaves are taken whilst tender, and after separating the central ribs, they are cut into strips and boiled in spring-water. They are dried first in the shade and afterwards in the sun, then made into rolls and kept in store, or sent to the market for sale. Before they are fit for writing on they are subjected to a second process. A smooth plank of areca palm is tied horizontally between two trees each *ola* is then damped, drawn back-wards and becomes perfectly dry. The writer

dries up, it is necessary to renew it till the effect is lost. The writer gives as follows:—
1) oil is
2) strips of
3) ing into
4) in the

Braids.
1999
Hats.
2000
FOOD
Sago.
2001

construction of straw or Leghorn hats.

Food—A kind of sago is yielded by the pith. Little information of a definite kind can be discovered as to the extent in which this starch is used in India as an article of food, nor as to the methods adopted in its

C. 2001

Sago Palm, the *Coscium***COSCINIUM
fenestratum**

preparation Knox says of Ceylon that the people "beat it in mortars to flour, and bake cakes of it, which taste much like white bread, it serves them instead of corn before the harvest is ripe"

Structure of the Wood—Soft with a hard rind composed of black vascular bundles. The vascular bundles in the centre of the stem are soft. Roxburgh remarks "I do not find that the wood is put to any useful purpose"

The tree often grows to a great size before flowering, one whose measurements were given in the *Indian Agriculturist* for November 1873 as flowering at Peradeniya, Ceylon, measured height of stem 84 feet, of flower panicle 21 feet, total 105 feet, girth at 3 feet from the ground round the persistent bases of the leaves 13 feet 9 inches, at 21 feet from the ground 8 feet 3 inches age about 40 years. The leaves are very large, often 10 to 16 feet in diameter.

Domestic and Economic Uses—In addition to what has been said of

WOOD
2002DOMESTIC
Beads
2003

Europe they are now largely employed in the manufacture of buttons. The trade in these nuts is chiefly carried on by Arabs.

Corypha Tallera, Roxb, Cor Pl, t 255

A closely allied species to the preceding, which bears most of the vernacular names given above and is put to the same industrial purposes, is a native of the north eastern coast of Madras especially in Coromandel. A third species may here be mentioned by name *C. elata, Roxb, Fl Ind 298*, a stately palm and native of Bengal, where it is known as *bajur*, but Roxburgh views *C. umbraculifera* as the intermediate form between *Tallera* and *elata*, so that even if future botanists continue to view all three as distinct species, for industrial purposes, they may be regarded as but forms of one plant. It would, indeed be impossible to separate under these plants the various properties assigned to them.

Ornaments
2004
Buttons
2005
2006**COSCINIUM, Colebr, Gen Pl I 35**

Coscium fenestratum, Colebrooke, Fl Br Ind, Vol I, 99,

[MENISPERMACEÆ

2007

VERN—*Glacchala*

..

Habitat—An extensive climber, met with in the forests of the Western Peninsula, and distributed to Ceylon and the Straits

The Costus	COSTUS speciosus
<p><i>Salem</i>) "This has been in use for some years in the hospital and found to be a fairly useful medicine in certain cases of dyspepsia. I think it a fairly good substitute for calumba. It has been used in the form of powder and infusion. Preparations, &c.—The same as calumba." (<i>Apothecary J. G. Ashworth, In Medical charge, Kumbakonam</i>)</p> <p>Trade—The root is sold in Madras at $\text{Rs } 1\frac{1}{2}$ per maund, and retailed at 2 annas a pound. There are no foreign exports of the root from India but it may be had in every large bazar throughout the country, so that there must be a considerable local demand.</p> <p>Cosmetic Bark, see <i>Murraya exotica</i>, Linn.</p> <p>COSTUS, Linn.; <i>Gen Pl</i>, III, 646</p> <p><i>Costus arabicus</i>, see <i>Saussurea Lappa</i> and <i>hypoleuca</i>, COMPOSITÆ</p> <p><i>C. speciosus</i>, Sm., <i>Wight, Ic</i>, 2014, SCITAMINÆ</p>	<p>TRADE 2012</p>
<p>" " " " " " " " " " " "</p>	<p>2013</p>

Tsana speciosa, Gmelin, IV, and the *Herba spiralis hirsuta* of Hort Sub Cal,

a
T
h
easily enough be exported from Bengal were some effort made to bring this root before the perfumers of Europe. There is a strong probability,

doubt however, that the latter and not the former is the drug sold in Indian bazars, but it is curious how the mistake of confusing two so widely distinct plants could ever have occurred. It has been deemed

COSTUS
speciosus

The Costus

2015

MEDICINE
Tubers.
2016

desirable to leave the available information in its present form, since it is by no means established that *Costus speciosus* is not used as a substitute for *Saussurea*

"§" Piesse's remarks must apply to *Aplotaxis* (= *Saussurea*), not to roots are quite insi-

as *Saussurea* there seems no doubt but that a certain amount of the tubers of *Costus speciosus* are regularly used by the natives of India both as food and medicine. The late Dr U. C. Dutt wrote on the margin of a copy of the of India, showing *Costus speciosus* at the Calcut (where a brief ing *Costus* and *Saussurea* is given), — this root is said to be bitter, astringent, and

pain in the throat the p writer and was *Costus*, not *Saussurea* alluded to, Dr Dymock says — root is described as depurative

"The *Costus speciosus*, but e been confused (in the literature of the subject, although they bear no resemblance to each other) perhaps for the past 200 years, but at the same time there is a certain amount of *Costus speciosus* root deliberately used, and not from any idea of adulteration with the supposed *Costus* of the ancients. Sir Walter Elliot gives several Sanskrit synonyms for *Costus speciosus*. He may have been mistaken as to these synonyms but he clearly recognised what the *Costus speciosus* of botanists meant, as he describes the plant. He refers to *Roxburgh's Flora Indica* Vol. I, p. 50 and to the Coromandel plants, page 126 and states that while Roxburgh in these works gives *Bomma kachchika* as the Telugu for *Zingiber roseum*, "in Vizagapatam, it (that name) is invariably given to *Costus speciosus*, which abounds in the forests of that province. The Sanskrit synonyms *Pushkara malaka* in Wilson's Sanskrit Dictionary, p. 545, and *Kasmira* (Wilson p. 219) and Brown's Telugu Dictionary, p. 224 are both applied to *Costus*." He further gives *Kasmiramu* as another Sanskrit synonym

the root of *Costus speciosus* is the root of a plant near water and is (sic) used in massulas inodorous, and tasteless. Here there seems no reason to doubt we have an allusion to *Costus* and not to *Saussurea*

Food.—The tuber is cooked in syrup and made into preserve in some parts of India, the natives consider it whole me. This information regarding India was first published by Roxburgh but Alms drew attention to the fact that in *Brown's Hortus Jamaica*, vol. II, p. 281,

FOOD
Tubers
2017
Sweetmeats
2018

C. 2018

Cotula or Babuna Alpine Stocks

COTULA
anthemoides

the root stock is said to be used as a substitute for ginger Dr Dymock
commenting on this statement remarks The rhizome resembles the

su cern to favour it The Revu A Carpué says it is
by the Santals

COTONEASTER, *Medik Gen Pl I 627*

[ROSACEÆ

Cotoneaster acuminata, *Linll Fl Br Ind Vol II 385,*

2019

Vern — *R u raun r us rish sh* HINDReferences — *Brand s For Fl 209 Gamble Mas Tin b 171*

Hab tat — A deciduous shrub of the H málaya from the Beas to Sikkim and occurring between 4500 and 13000 feet

Structure of the Wood — Hard like that of *C bacillaris* used for walking sticks

WOOD
2020*C bacillaris, Wall Fl Br Ind, Vol II 384*

2021

Vern — *R i r u l n l n u lehan khár s luní rau reúsh reús rish stelu*

R

Hab tat — A small deciduous tree of the Salt Range above 1500 feet of the North West H málaya from the Indus to the Sarda between 5000 and 10000 feet and of Sikkim and Bhután

Structure of the Wood — Wood smooth very hard close and Used for making walking sticks usually made of this wood and the tree is also used to transport it to the plains from many points along the H málaya This is the *Cotoneaster obtusa* alluded to in the Settlement Report of the Simla district in which it is said the hill tribes use the sticks as goads (*chalta*) The larger pieces are made into jampan poles axle handles &c Baden Powell suggests that it is suitable for turning

WOOD
2022*C microphylla, Wall Fl Br Ind II 385*

2023

Cotton and Cotton Manufactures see the article *Gossypium* in Vol III

Fruit
2024COTULA, *Lin Gt Pl II 48**Cotula anthemoides, Lill Fl Br Ind III 316 COMPOSITE*

2025

Vern — *Babúna* PS HIND

C 2025

CRAMBE
cordifolia

The Cow Tree

MEDICINE.
Fowers.
2025

Hab. nat.—A small herbaceous plant found in the Gangetic plain, from Rajmahal and Sikkim westwards, to the Panjab.

Medicine.—It furnishes part of the official *babing*, which is heated with oil and applied externally in rheumatism, &c. Compare with *Anthems nobilis*, *Linn.*, A. 1185.

§ "The infusion is used as an eye wash, in most diseases of the eye (*Surgeon-Major C. W. Culthrop, M.D., Morar*).

Country Borage, see *Coleus aromaticus*, *Ben'l.*; LABIATÆ.

Cotyledon laciniata, *Roxb.*, see *Kalanchoe laciniata*, *DC.*

COUSINIA, *Cass.*, *Gen. Pl.*, II., 467.

2027

Cousinia minuta, *Bour.*; *Fl. Br. Ind.*, 359; COMPOSITÆ.

Syn.—*C. calcitrapifloræ*, *Juss. & Spach.*; *C. ayalensis*, *Bunge*.
Vern.—*Lakoti*, *po.*; *kand eri*, or *kand eri*, *Ps.*

Reference—*Stewart*, *Ps. Pl.*, 115.

Hab. nat.—A small rigid herb, found in a wild state in some parts of the Western Panjab plains, and attributed to Afghanistan, Baluchistan, and Persia.

FOOD
2025

Food.—The young plant is used as a vegetable in the Salt range (*Stewart*).

Covellia glomerata, see *Ficus glomerata*, *Roxb.*; URTICACEÆ.

Cow itch or Cowhage, see *Macuna pruriens*, *DC.*; LEGUMINOSÆ.

Cowrie, Kawrie or Cowdie Pine, commercial name for *Dammara australis*, see under *Dammara*, *Hopea*, and also *Canarium*, C. 273.

Cowrie or Cowry, see *Shells*, also *Beads*, B. 350.

2029

Cow Tree.—Many plants, with milky sap, receive the name of Cow Tree. Perhaps the only peculiarity that more especially justifies that name is when the sap contains very little Caoutchouc and is wholesome. The Cow Tree of most writers is *Brosimum Galactodendron*, to which Humboldt was the first to draw special attention. It is a member of the Bread-rut family (*Artocarpeæ*). Several fruitless efforts have been made to introduce this plant into India, see the *Indian Forester*, IX., 517.

Crab's Eye, see *Nela Aredarich*; also *Abrus precatorius*, A. 71.

Crab Tree, see *Pyras Malis*, *Linn.*; ROSACEÆ.

Crabs, see *Crustacea*.

CRAMBE, *Linn.*, *Gen. Pl.*, I., 93

2030

Crambe cordifolia, *Spreng.*, *Fl. Br. Ind.*, I., 165; CARYOPHYLLACEÆ.

Habitat.—A tall herbaceous annual, with leaves nearly a foot in diameter. Frequent in the North-West Himalaya, Quetta, Western Tibet, &c., at 8,000 to 14,000 feet.

FOOD
2031

Food.—The young leaves are, in the Salt range, eaten as a pot herb (*Stewart*), and in Baluchistan the roots are eaten (*Stewart*).

C. 2031

Hawthorn The Bel Fruit of some Writers

CRATÆVA
religiosa.

CRATÆGUS, Linn, Gen Pl, I, 626

Cratægus Clarkei, Hook f, Fl Br Ind, II 384, ROSACEÆ

2032

A species of hawthorn met with in Kashmir, which may be viewed as intermediate in type between the two following species

2033

C. crenulata, Roxb, Fl Br Ind, Vol II, 384

THE HIMALAYAN WHITE THORN

Syn — C PYRACANTHA, Persoon; MESPILUS CRENULATA, Don

Vern — *Gingaru gyanru*, HIND, *Gengaru*, PB

References — Roxb, Fl Ind, Ed C B C, 406 Vingt Hort Sub Cal 198 Brandis, For Fl, 208 Gamble Man Trib 170 Dala & Gibb, Bomb Fl Supp 132 Baden Powell, Pb Pr, 576 Drury, U Pl 208 Calfour, Cyclop, 836 Treasury of Bot, 344

Habitat — A large spinescent shrub of the Himalaya, from the Sutley to Bhutan, found at altitudes from 5 000 to 8,000 feet, but in Kumáon at 2 500 feet

Structure of the Wood — White, hard, very close and even grained, used as axe handles, staves, &c

WOOD

2034

C. Oxyacantha, Linn, Fl Br Ind, II, 383

2035

THE HAWTHORN

Vern — *Ring, ringo ramnia pingyat*, or *pingyat, phindak, patákhan, ban sangli, sursingli* or *singli* PB HIMALAYAS, *Ghwansa*, or *ghwardsa*, TRANS-INDUS *Durana* AFGH

Habitat — A small tree (20-30 feet) met with in the North West Himalayas from Quetta to the Rávi basin Cultivated eastwards near villages, and in Afghanistan is a favourite tree planted near tombs

FOOD
Flowers

2036

Fruit

2037

WOOD

2038

poses as the preceding

CRATÆVA, Linn, Gen Pl, I, 110

Cratæva religiosa, Forst, Fl Br Ind Vol I, 172, CAPPARIDÆÆ

2039

Syn — CAPPARIS TRIFOLIATA, Roxb, C ROXBURGHII, Ham, C NUR VALA, Ham

Vern — *Barna barun b lsi, bila bilana* HIND, *Barun, tikto-shak BENG, Tasladu, bundoronda, MECHI, Purbong, LEPCHA, Barna, barnahi, PB, RAJ, Bela, bel, C P, Vápararna bhutavarná káda rarna, kumla paruna karwan, BOME, Kumla karwan, MAR, Mára lingam, narvilinga, narvata, TAM, Nirvata vitusi KAN, MAL, Ushia usiki, usiki mánu ulimidi urimidi urumisti, tella ulimidi tella wle, TEL, Nirujani COORG, Aadet katat BURM, Varuna asma righna SANS Roxburgh says that it is the *Tikto-shaka* of Sanskrit writers*History — L
Ægle Marmelc
Cratæva Marm
the same vern
inces and in

HISTORY.

2040

C. 2040

CRATÆVA
religiosa.

Cratæva or Bel.

HISTORY

Ind.), under *Cratæva religiosa*, gives the following vernacular names as

that the medicinal leaves sold at the present day are those of *Ægle* not of *Cratæva*.

A brief review of the confusion which exists, in the literature of India, between *Cratæva* and *Ægle* is given by *Dr. W. D. Hooper* in his *Journal of the Asiatic Society of Bengal*, vol. xiv, p. 100.

Dr. Hooper describes *Ægle Marmelos*, quotes the same botanical description, the same name, and the same fruit as *Cratæva*.

Dr. Hooper is meaning when he says "The species in question I have never seen," nor can we presume that he was labouring under the idea that *Cratæva Marmelos* was a different plant from *Ægle Marmelos*, seeing that in his two articles upon the medicinal product discussed he quotes the

name for the plant. It is worth noting that the use of the word 'Bengal' practically implies that the Madras supply was imported from that province. *Roxburgh* wrote his *Flora Indica* about the same time as *Ainslie* produced his *Nateria Indica*, and the latter author frequently admits that he had seen the MS. of *Roxburgh's* work. In the *Flora Indica* it is stated of *Ægle Marmelos* that it is a native of the mountains of Coromandel, "and is also found sparingly, in the lowlands." Is it thus possible that, before the *Bel* fruit was cultivated to the extent it now is, *Cratæva* took its place (at least as a medicinal yielding tree) and was displaced from popular favour, the *Bel*, as we now know it, receiving many of the older names? If so, the botanical name *religiosa* may rest on a stronger basis than the mere fact that the tree is grown near temples and tombs. *Lisboa* says: "So far as my enquiries go, it is not mentioned in Hindu religious books, nor used in their worship." But does this rest on the evidence in classical literature that refer it mistakenly to *Ægle Marmelos*, or simply on the words *Bel*, *Bel*, &c.

The Bel Fruit and Crataeva

CRATÆVA religiosa.

HISTORY

Botanical evidence would point to *Ægle* being almost insular in its character, and it may be doubted if it is even grown to any extent in the present day beyond the limits of peninsular India, it does not succeed, for example, in Northern Panjāb. But *Crataeva* is more continental in its distribution, and is therefore more likely to have been known to the ancients.

The writer's object, however, in suggesting a doubt regarding the bel fruit will be gained if greater attention is paid to the two most useful plants—*Ægle Marmelos* and *Crataeva religiosa*.

References—*Roxb., Fl. Ind. Ed. C.B.C., 426* Brandis *For Fl., 16* *Aurs., For Fl. Burm., 1, 66* *Gamble, Man. Timb., 15*, *Dals & Gibs., Bomb. Fl. 8*, *Stewart, Pb. F. Elliot, Flora Andhrica* *Mat. Ind., 11, 86, 19* *deen Sheriff, Suppl. F. 115 323* *Dymock, Ma. Drugs 13, Pl. and Dr.*

tree near temples and tombs

Varieties—The *Flora of British India* refers the forms of *Crataeva* to two varieties, which seem in a measure to correspond with the species of that genus alluded to by authors on Economic Botany.

Var 1st, *Nurvala* Leaflets ovate-lanceolate, taper-pointed berry ovoid-oblong—This appears to be the *C. Nurvala* of Hamilton and the *Nurvala* of Rheede. Dalzell and Gibson say this form is the true "*Varvanna*" and is met with in the Caranjah Hill, Warree country. Wight and Arnott (in their *Prod. Floræ Penins. Ind. Or.*) speak of it as "frequent in rich moist soil on the banks of ditches and rivers on the Malabar coast, also in Mysore, where it grows to the height of 15 or 20 feet." They also state that it is the *C. Tapia, Burm. (in part)*, and also the *C. inermis, Linn. (in part)*.

VARIETIES.

Var 1st,
Nurvala
2041

With the exception of the middle paragraph (p. 111) in *Marmelo* (p. 459) in *Elley in Sans. T.* that write of *Ægle* "the most pellucid glands in the tissue would be proof positive of the leaf not being *Crataeva*." Ainslie further states however, of his plant that "the root, is

sub-aromatic and bitterish taste, quality." He further observes of Rheede, and the *lunu-xarna* catalogue of *Ceylon Plants*, affirms the next variety. This is there-

fore, the only serious mistake made by Ainslie in his attempt to distinguish the two forms of *Crataeva*.

Var 2nd, *Roxburghii* Leaves small ovate-lanceolate abruptly acuminate, berry globose—This is *C. Roxburghii, Br.* and the *C. odorata religiosa*, and unilocularis of Hamilton, and the *Capparis trilocularis* of

Var. 2nd
Roxburghii
2042

CRATÆVA
religiosa

Forms of Cratæva

VARIETIES

Roxburgh, Dalzell and Gibson say it is common on the banks of the Nerbudda, Roxburgh, that it is ""

Varana, Sans. He further calls it the "Smooth Tapia or Garlic Pear," the latter name, as he explains,

tea-spoonful twice or thrice daily." Sir Walter Elliot alludes to this form in his *Flora Andhrica* (pp 180, 185, 187), and gives it the Telugu names of *ulimidi*, *usiki manu*, *tella-ulimidi*.

It may be worth pointing out that it is the leaves of variety Nurvala ns may in the pris ng that he does not tell us whether or not the natives of India were in his

another Jamaica species, *C. gynandra*, he says "that the root blisters like cantharides."

These facts are of the greatest importance, in the confirmation which they afford to the opinions, expressed on a further page, by Dr Moodeen Sheriff, as to the rubefacient properties of the leaves. It would be instructive to learn whether these properties were common to both forms of *C. religiosa*, or only possessed by the form which bears Dr. Roxburgh's name. There is also another point of some importance. Ainslie in his article on "*Cratæva Marmelos*" (*Atlas Ind.*, I, 86), which is clearly an account of *Ægle Marmelos*, and again, in the 2nd paragraph of his article on "*Cratæva religiosa*," refers to a resin found within the fruit, which he regards as of great value "in clearing foul ulcers." It is also used, he informs us, "in the arts as a cement." This resin and cement is well (the seeds)

Cratæva becomes possible tated that to form a ly different Ægle and

Cratæva becomes possible

Gum and Dye — "Aitchison states that at Jhelum the fruit is mixed with mortar to form a strong cement, and the rind as a mordant in dyeing" (*Stewart*)

Medicine — From what has been said it may be inferred that some doubt still exists as to whether the medicinal products of *Cratæva* can be spoken of as afforded by the one species or two species. The writer must

* A name which does not appear now to be in use in Hindustan, although mentioned by the older writers.

Leaves
2043
Bark
2044
Fruits
2045

Cement
2046

MORDANT
2047

MEDICINE

The Nurvala

CRATÆVA
religiosa.MEDICINE.
Bark
2048
Leaves,
2049

common complaint of a somewhat obscure nature. The leaf-juice is given in rheumatism in the Concan in doses of $\frac{1}{2}$ to 3 tolas, mixed with coconut juice and oil. In caries of the bones of the nose the leaf is

Juice,
2050

lingai, I AM," that "the leaves, bark, and roots are used medicinally."

will
be iras.
not

and
badur,

light-
boards, combs, and in turnery. In Trichunopoly it is also used "for
making planks and as firewood"

FOOD.
Fruit,
2052
WOOD,
2053

C. 2053

CRINUM.

Famine Food

CRATOXYLON, *Blume, Gen Pl, I, 166*

[HYPERICINEAE]

- 2054 *Cratoxylon formosum*, *Benth et Hook, Fl Br Ind, I, 258*,
A large tree, met with in the Andaman Islands, yields a useful timber,
but the tree is rare (*Kurz, For. Fl. Burm, I, 84*).
- 2055 *C. nerifolium*, *Kurz, Fl Br Ind, I, 257*
Vern — *Baibya* BORM
Habitat — A moderate-sized tree, found in Chittagong and Burma
Structure of the Wood — Dark grey, hard, close-grained. According
2056 to Kurz, it is used for building purposes, for ploughs, handles of chisels,
hammers, and other implements

CRESSA, *Linn, Gen Pl., II, 881*

- 2057 *Cressa cretica*, *Linn, Fl Br Ind, IV., 225*; CONVOLVULACEAE
Vern — *Gul*, *Sind*, *Khardi*, *BOMB*, *Chavel*, *NASTIK* (BOMB), *Uppu*
zanaga 1st (Sir Walter Elliot remarks regarding the above Telugu
name that "the plant is so called from frequenting salt lands near the sea,
where it has much the look of young *Chenna* or *Cicer*")
References — *Roxb Fl Ind, Ed. C B C, 265*, *Dals and Gids, Bomb*
Fl 142, *Voigt, Hort Sub Cal, 353*, *Grah, Cat Bomb Pl, 133*, *Dy-*
mock, Mat Med W Ind, 2nd Ed, 569, *Walter Elliot, Flora And*
hrica, 186, *Bomb Gaz (Cutch), V, 27*, *Stocks Account of Sind*,
Aitchison, Cat Pb and Sind Pl p 98, *Sakharam Arjun, Bombay*
Drugs, 93
Habitat — A small erect shrub, common throughout the warmer parts of
India especially near the coast from Multan, Baluchistan, and Sind, through
Gujarat southwards to the Coromandel coast, and distributed to Ceylon
Appearing in the fields after the rains
Food — Stocks mentions that in Sind the seeds of this plant are
2058 mixed with wheaten flour
Dymock mentions that in
aten during the famine of

MEDICINE

- 2059 Medicine — Dr Sakharam Arjun says "It is used as a tonic and
is believed to possess expectorant properties" Dr Dymock remarks "
"It is found in Greece, and is supposed by some to have been one of the
two kinds of *ἀνθαλίς* described by Dioscorides "

2060

CRINUM, *Linn, Gen Pl, III, 726*

A genus so named from the Greek *κρίνον*, a lily (*Theophrastus*) It con-
tains about sixty species mostly natives of the tropical regions in the old and new
worlds.

Toxicarium.	CRINUM asiaticum.
<p>{ <i>Kunth, Enum, V, p. 562; ANARYLLIDÆ.</i></p> <p>Crinum amœnum, <i>Roxb, Fl Ind, Ed. C B C, 283; Herbert, 255;</i></p> <p>Vern.—<i>Gocinda, SYLNET</i></p> <p>References.—<i>Drury, Fl. Ind, III., 454; Voigt, Hort. Cal, 590</i></p> <p>Habitat.—A native of Nepal, Sylhet, and Burma, flowering nearly all the year, but mainly in the hot and rainy seasons; the flowers are large and white,</p>	<p>2061</p>
<p>C. asiaticum, <i>Linn.; var. toxicarium, Herbert, Bot. Mag., 1073.</i></p> <p>Syn.—<i>C. toxicarium, P. B. Ind. of W. Ind. I. 2011; C. amœnum, Roxb; Bot. M. V. p. 4</i></p> <p>Vern.—<i>Chundar, kangal, pindar, kanmu, HIND, Nagdown</i> (according to Dymock), <i>BOMB, Nagdamani, Guz, Nagadiwana, MAR, Nagin-ka patta, Duk, Bara kanur, nagdown, boda kanod</i> (gaer-honar-patta, according to Bidie, Dymock, &c), <i>BENG, Vish-mungui, TAM, Koyangi, lan sy lan, Vishaman</i></p> <p>References.—<i>Roxb, Fl Ind, Ed. C B C, 283, Voigt, Hort. Sub. Cal,</i></p>	<p>2062</p>

Habitat.—A fairly abundant cultivated plant, its erect stems with their crown of large gracelul leaves forming almost a characteristic feature of

erect stem in distinguishing it from *C. deflexum*, and he expresses the opinion that it may be a native of Ceylon. Speaking of that region Thwaites remarks that "it is very abundant on the sea-coast of the island," and "frequently planted as a fence for native gardens near the sea."

Although thus not establishing fusion in the synonymy of the Economic Botany give the *aticum*. This idea has been probable future investigation may relegate to *C. defixum*, *C. amoenum*, or *C. pratense* much of what is here given under the popular name *C. asiaticum*.

Medicine.—Ainslie wrote in 1826: "The succulent bitterish leaves of this plant, which are about 2 inches broad and 3 feet long, the natives bruise and mix with a little castor-oil, so forming an application which they think useful for repelling whistows, and other inflammations that come at the end of the toes and fingers, the juice of the leaves is employed

MEDICINE
Leaves
2063
Julce
2064

C. 2064

CRINUM
pratense

Toxicarium—a useful Emetic.

MEDICINE
Root
2005

for the ear-ache in Upper India. In Java, by Horsfield's account, this plant is reckoned one of the most satisfactory emetics the inhabitants have "It is the root (? bulb) chewed that is the emetic, provided a little of the juice is swallowed" Sir William O'Shaughnessy, who wrote some 20 years later, says: "into a paste, a emetic after a phoretic, we have never known it to occasion any untoward symptoms. The dried sliced roots are also an efficient emetic, but require to be given in double the dose of the recent article" The extract, whether watery or alcoholic, is very uncertain in its action. In the form of a syrup it may probably be found to retain the native principles of the recent plant. The tincture of the fresh plant does not succeed, doubtless in consequence of the large quantity of spirit counteracting the emetic effect by its stimulating energy.

Extract
2006

These two passages express all that has since appeared, as for example, in the *Pharmacopœia of India*, Drury, Murray, K. L. De, and indeed most subsequent writers, repeat in other sentences the same facts. Dr. Dymock adds "I have not met with any account of this drug in native works on

Bulb
2007

... relating the juice being used for ear-ache, Dr. Dymock gives as a footnote "A well known popular use of the plant, the leaves are slightly roasted, and the juice is then expressed and a few drops poured into the ear"

The bulb of the so-called *Crinum asiaticum* is made official in the

... (Dr. H. W. Hill, Manbhoom)

2068

Crinum defixum, Ker (and of Gawl), *Herbert*, p. 255; *Bot. Mag.*

Syn — *C. ASIATICUM*, Roxb (non Linn), *Fl Ind*, Ed C B C, 233; *C. ROXBURGHII*, Dals, *Fl Bomb*, 275, BELUTTA POLA TALI, *Rhede*, XI, t. 38, RADIX TOXICARIA SECUNDA, *Rumph*, VI, 156

Vern.—*Suk darshan*, BENG, *Nagdown*, BOMB; *Kesar chettu*, TEL; *Hintolabo*, SING (according to Ainslie)

References — *Dals & Gibs*, *Bomb Fl*, 275, *Lisbon*, *U Pl Bomb*, 204

Habitat — A native of the Concan, of Coromandel, and of many parts of Bengal, as, for example, the Sunderbunds. Flowers large, sessile, white, fragrant during night, flowering time, the close of the rainy season. Dalzell and Gibson say it is common on the banks of

MEDICINE
2069
2070

C. pratense, *Herbert*, *Amaryll.*, 256.

Syn — *C. LONGIFOLIUM*, Roxb, *Fl Ind*, Ed C B C, 234; *C. LAURIFOLIUM*, *Herbert & Roxb*; *C. ELEGANS*, *VENUSTUM*, and *CANALIFOLIUM*, *Carey*

Vern — *Pa tain*, BURM

References — *Voigt*, *Hort Sub Cal*, 590, *Bot Mag*, t. 2392 and 2127

C. 2070

The Common Crocodile

CROCODILUS
palustris.

Habitat.—A native of the interior of Bengal, Sylhet, Pegu, &c., flowering time the rainy season. Flowers large, white, fragrant. A variable plant, some of the names given above belonging to what may prove recognisable forms.

2071

Crimum, sp. (found in Chutia Nagpur)

2072

Mr. C. B. Clarke writes of this plant that he is unable to name it and presumes it may be an undescribed species. In that case it should bear the discoverer's name—the Rev A. Campbell. Mr. Clarke also informs the writer that he has collected another species in the tanks of Chutia Nagpur which flowers in November, he views this as distinct from the common Sunderband species, which flowers in May.

Vern.—*Sikyom baha*, SANTAL.

Habitat.—High and dry situations in Chutia Nagpur, flowering during the hot season before the leaves appear. In some respects, this resembles *C. latifolium* as described in Roxburgh's *Flora Indica*.

2073

Medicine.—Mr. A. Campbell says "The bulb is sometimes as large as a good-sized turnip, and of the same shape. A decoction prepared from it is given internally and pounded and made into a paste, it is also applied externally by the Santals in dropsy. It is used for the diarrhoea of cattle."

MEDICINE
Bulb
2074

C. zeylanicum, Linn., Wright, Ic 2019-20

2075

Syn.—*C. ORNATUM*, Herbert. *C. ZEYLANICUM*, Roxb. *C. LATIFOLIUM*, Roxb. *C. MOLUCCANUM* Roxb. *C. HERBERTIANUM*, Herb., p. 253, also Wall., *Pl. As. Rar.*, 2 p. 145.

Vern.—*Sukh-darshan*, BENG., *Gadambikanda*, BOMA., *Goda manil*, SING.

Re.—

Habitat.—A very variable plant, some of the above synonyms corresponding to well marked varieties, which in a work on economic products, may be described as follows:—

conference

Medicine.—Dymock remarks of this species "The bulb is extremely acid and is used for blistering cattle, a slice being bound upon the skin. When roasted it is used as a rubefacient in rheumatism."

MEDICINE,
Bulb
2076

CROCODILE (CROCODILUS, Cuv.)**Crocodilus palustris, Less.**

2077

THE COMMON CROCODILE, often vulgarly called in India, the Alligator—an American Reptile.

C. 2077

CROCUS
sativus.

The Crocodile; Saffron.

There are apparently two other species besides the above met with in India, viz., *C. porosus*, *Schneid*, and *C. trigonops*, *Gray*. The long snouted Gavial lives on fish and turtles, and frequents the rivers of India along with the Crocodile.

Vern.—*Magr, kumhar*, HIND, *Sisan*, SIND

Habitat.—Found throughout India and Ceylon, affecting rivers, lakes, marshes, and even the sea coast. It may be recognised by its shorter and broader snout than that of the Gavial, and by the first and the fourth tooth of the lower jaw fitting into the upper.

Although held sacred in many parts of India (and sometimes even

great size, being from 15 to 30 feet in length, and although it is reported to eat the dead bodies thrown into the rivers, it lives mostly on live animals, taking human beings when pressed for other food.

Economic Products.—OIL, SKIN, MUSK, and FLESH,

Crocodile Flesh.—In many parts, Crocodile flesh is said to be eaten or

Africa appear to regularly extract Forbes Watson, in his *Industrial* sample of this substance procured

from Travancore

Crocodile Oil.—The oil of the Indian Crocodile contains a larger quantity of solidifiable fat than either neat's-foot or any fish-oil. It is prepared by the Sanil tribe, in the Panjab, who eat crocodile flesh, and is also said to be procurable in abundance at Agra (*Spons' Encyclop* 5136)

CROCUS, Linn, Gen Pl, III, 693

This is the *κροκος* of *Dioscorides*. It is not alluded to by the earlier Sanskrit writers, but Arab authors speak of it as cultivated in the tenth century at Darband and Ispahan, and Chinese writers state that it was introduced into their country by the Muhammadans in the Yuen dynasty (A. D. 1280).

Crocus sativus, Linn, Royle, Ill Him Bot, t 90, IRIDEE.

SAFFRON

Vern.—*Yafrañ*, BENG; *Kesar, safran*, HIND; *Safran, kesar, kecara*, BOMB; *Kecara, MAR*; *Keshar, GUZ*; *Kuikuma, Kashmiri*; *Acaslie*, *kumkuma* (Dutt); *safran* (Dymock), SANS; *Zaafaran*, ARAB; *PERS*; *Kungumapu*, TAM; *Kunkum apate*, TEL; *Thanwai* (Mr Oliver, Forest Officer in Burma, informs the writer that this is the

Re,

Sheriff, Supp Pharm Ind, 118, *D C Dutt* *Med A*
Black & Hanb Pharmacop, 663
Murray, 111
14; Baslet
ms 1 r 89
546, Sim

monds, Trop Agr, 379

C. 2083

Saffron, Indian Crops	CROPS.
Habitat.—The European supply of this plant comes from France,	SAFFRON.
	DYE. 2084
highly thought of as a remedy for catarrhal affections of children, and is used in certain Indian dishes as a colouring agent. Mullahs (priests) make a kind of ink with this substance with which they write charms (<i>Dr Emerson</i>). In over doses it is generally reported to act as a narcotic poison. Ainslie gives perhaps the most complete account of the native uses of this drug, and of the opinions which prevailed among	MEDICINE 2085 2086
torius)	
Chemistry —§ "The colour of saffron is due to the presence of a glucoside polychrom, which is decomposed by acids, with the formation of a new colouring principle <i>Crocin</i> " (<i>Prof Warden, Calcutta</i>). For full particulars as to the chemistry of this drug see the <i>Pharmacographia</i> , p 666.	CHEMISTRY 2087
Trade in Saffron —The imports of foreign saffron were in 1882-83, 226 cwt valued at Rs. 25,224, and in 1880-81, 268 cwt valued at Rs. 50,383. Of the Indian imports the bulk comes from France	TRADE 2088
CROPS.	
An important feature of Indian Agriculture is the fact that, through the presence of extensive montane tracts, India possesses considerable areas that are under temperate influences, as well as vast expanses that are purely tropical. Between these two conditions almost every possible gradation exists in which the tendency to extreme humidity or extreme aridity modifies the general character. From this point of view alone	2089
sometimes three harvests a year. This is modified in certain provinces through the rains not occurring at the same period. Thus, in Bengal, Bombay, the greater part of the Central Provinces, and in Berar, the rains	

CROPS

Indian Crops.

occur in June, July, August, and September, being preceded by the hot

seen that to study the crops of India, the closest attention must be paid to this shifting of

In the regions

marked crops

The temperate mountains within these regions have accounts of the
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place in this work

2090 1st, CEREALS—This includes Wheat, Rice, Oats, Barley, Indian-corn, Millets (various kinds), and Coix (Job's tears) (Conf. with Cereals)

2091 2nd, PULSES—Such as Gram, Peas, Beans, Lentils, &c (Conf. with Pulses.)

2092 3rd, GRASSES—Such as Grass, &c This or eaten boiled the GRASSES (also)

2093 4th, SPICES AND CONDIMENTS—Turmeric, Ginger, Cumin, Coriander, Caraway, Pepper, Betel-leaf, Capsicum, Cardamum, &c, &c (Conf. with Spices)

2094 5th, STARCHES AND SUGAR—Sugar-cane, Arrow-root, Sago, &c (Conf. with Starches)

2095 6th, GARDEN PRODUCTS AND VEGETABLES—Potatoes, Yams, Colocasia, Cabbage, Gourds, Melons, Cucumbers, &c, &c (Conf. with Vegetables)

The above might be grouped as edible products, but there are other crops some of them of even great importance, such as—

2096 7th, FIBRES—Cotton, Silk, Jute, Sunn-hemp, and many others, the fibre from Hibiscus cannabifolius being, after sunn-hemp, the next most important of fibre crops (Conf. with Fibres)

2097 8th, DYES—Indigo, Safflower, Al (Morinda tinctoria), Madder, &c (Conf. with Dyes and Tans)

2098 9th, NARCOTICS—Opium, Ganja, Tobacco, Tea, and Coffee. (Conf. with the separate accounts of each of these products and with the article Narcotics)

Crops; Sunn-Hemp.

CROTALARIA
juncea.

10th, OIL-SEEDS—Ground-nut, Rape, Mustard, Cotton-seed, Linseed, Opium-seed, Castor-oil, Gingelly or Sesame oil, &c (Conf. with Oils)

2099

These are the principal crops of India, but the agriculturists have

CROTALARIA, Gen. Pl, I, 479.

2100

A genus of plants closely allied to the Broom, the generic name being derived from the Greek *κροτάλον* (a castanet), in allusion to the rattling noise made by the loose seeds within the inflated pods. This same idea, according to Sir Walter Elliot, is implied by the Sanskrit name *Ghanter atomu*.

Crotalaria Burhia, Hamilt, Fl. Br. Ind, II, 66, LEGUMINOSÆ

2101

Vern.—*Sis, sissai, meuni, pola, khippi, buta, kkep, khip, khip bhata, buti, lathia, kharzan kauridia, Pb, Ghagari, MAR, Ghugharo, GUZ, Druunu, SIND*
References.—*Pl. Br. Ind, I, 479, II, 66, III, 101*

Rajputana Gas, 301

Habitat.—A low under-shrub, abundant in the sandy plains of Sind, Panjab, Rajputana, and Cambay, ascending to 4000 feet in altitude.

Fibre.—Is said by Mr. Baden Powell to yield a good fibre for cordage, used, to some extent, in the Panjab in place of the Sunn-hemp (*C. juncea*) of other provinces.

FIBRE,
2102
MEDICINE,
Branches,
2103
FODDER,
2104
2105

Medicine.—The branches and leaves are used as a cooling medicine.

Fodder.—The Rajputana Gazetteer states that the plant is much valued as a fodder.

C. juncea, Linn, Fl. Br. Ind, II, 79

SUNN or SUNN HEMP or INDIAN HEMP, FALSE HEMP, BROWN HEMP, BOMBAY or SALSETTE HEMP, WILCOONAR (or TRAVANCORE FLAT), JUBBULPUR HEMP, &c, &c

Syn.—*C. tenuifolia, Karb*

Vern.—*Sun, sanai, sani (or sun, shon), HIND, BENG, Ausd, suila, Assam, C. juncea, C. juncea*

ing to Sir Walter Elliot), SANS

According to some writers the name *Ambadi* or *amburi* is, in Western India, given to this plant, but it seems probable that that name should be restricted to *Hibiscus cannabinus*. Indeed, it has been found difficult to arrive at any definite idea regarding the present area under sunn-hemp cultivation on the fact that the above *Hibiscus* appears to be confused with it. In Bengal, and indeed in some parts of the N-W Provinces,

CROTALARIA juncea.	History of Sunn-Hemp
FIBRE.	<p>nus are separately reported It would thus appear that the term "Bombay hemp" is often, though incorrectly, given to the Ambadi fibre, <i>Hibiscus cannabinus</i> It is thus unfortunate that, in modern commerce, the term "hemp" should ever have come to be applied to any but the true hemp plant, as, by this usage, widely dissimilar products have been almost hopelessly confused The <i>sunn</i> is a bush closely allied to the English broom or the Indian <i>dal</i>, while the <i>ambari</i> is a <i>Hibiscus</i> or cotton-looking plant with sharply-cut leaves not unlike those of the hemp plant,—hence the specific name <i>cannabinus</i> The true hemp has its nearest affinity, of fibre yielding plants, in the common nettle The hemp fibres thus afforded by these three plants have little or nothing in common</p> <p>References —<i>Roxb, Fl Ind, Ed C B C, 545, Voigt, Hort Sub Cal,</i></p> <p>Habitat —The <i>Flora of British India</i> gives the habitat of this plant as "Plains from the Himalaya to Ceylon, but often planted for its fibre" The writer is not aware of <i>Crotalaria juncea</i> having been recorded as found in a wild state anywhere in India although it may sometimes exist as an escape from cultivation Kurz says of <i>C juncea</i> in Burma "like wild along the banks of the larger rivers, especially the Irrawaddy," and Griffiths that <i>C. juncea</i> is met with in Afghanistan Roxburgh describes a form (by modern botanists reduced to the present plant, viz, <i>C. tenuifolia</i>) which he states is a native of Coromandel Many writers however, familiar with the living plants, still affirm that <i>C. juncea</i> and <i>C. tenuifolia</i> are distinct They seem at least to be cultivated recognisable states which, owing to the reputed superiority of the fibre of <i>C tenuifolia</i>, it might, for historic point reported the as next found be cultivated</p>

History of Sunn-Hemp

CROTALARIA
juncea

to this day, although as yet it has not been reported as found anywhere between these remotely distant regions. At the same time *C. juncea* is competing for popularity in the Panjab and Sind which yields a fibre a superfluous.

SUNN (or SAN) HEMP FIBRE.

Under the heading *Cannabis sativa* the suggestion has been offered that the Greek and the Latin *cannabis* may have been derived from the

FIBRE.

2106

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is that
Even
ication,
r than
of flax

of hemp, such names as *shesh* implying an intoxicating power—a property of the hempen fibres possessed alone by *Cannabis sativa*. The *sana* fibres of the *Sann* are not *Crotalaria* but *Cannabis*.

It is a fact that *Crotalaria* is not *Cannabis*.

CROTALARIA
juncea.

History of Sunn-Hemp

FIBRE.

the name for gr . . .
for the *kshaur*
it was made . . .
made, the *patt* . . .
probability the sunn hemp made garment Later writers speak of *sana*

The hill tribes of the North-West Himalaya weave a proportion of their clothing of hemp, but although the plant springs up wild all over the plains

Sacred
Threads
2108

sana has been carried, at the present day, to the extent of violating even this injunction. Lisboa (*Bombay Useful Plants*, p 290) states "It . . . distinction, ed threads

it appears
to justify
can it be
even said to be a native of Persia, though it may possibly be of China, as it is of Russia, Siberia, and Kirghiz. On the other hand, *Crotalaria juncea*, while met with to-day almost exclusively under cultivation, would appear to be a native of India, and possibly also of Central Asia, many other

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prefer to cultivate *sunn* hemp (*Crotalaria juncea*) or *san-pai* (*Hibiscus cannabinus*) for the cordage and sacking required for agricultural purposes. There is still a further consideration, and one of some importance, viz., that on the plains of India the hemp plant does not produce fibre of any value. Unless, therefore, we are to presume that it has degenerated, or that the climatic conditions of India have altered, the ancient people of the plains were not likely to have obtained their *sana* fibre from *Cannabis sativa*.

We may conclude this brief historic review of the hemp plants by giving the opinions that prevail regarding the origin of our word "hemp."

Cultivation of *Sunn*-HempCROTALARIA
juncea

Royle in his *Fibrous Plants of India* traces hemp from *sunn*. Speaking of *sunn*-hemp, he says "Its name, Shanapam or Janapa on the Madras side, is not very unlike Canapa, Hampa, Hennip, and Hanf. From these we derive our own name 'Hemp'." In Mysore it is known as *sanabū*

and
may
Veda
in al
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chan

Greek and Latin, and *kannab* in Arabic

CULTIVATION.

Sunn is grown by itself or at times is cultivated in strips or around the margins of fields. It is never cultivated as a mixed crop. Throughout India as a whole it is a *kharif* crop,—that is to say, it is sown about the commencement of the rains and cut at the end of September or beginning of October. It is thus off the ground to allow of being followed by a *rabi* crop in the same year. But in some parts of India there are two crops of *sunn* hemp. Thus in the *Thana District* of Bombay it is sown in November after the rice harvest, and the stalks are pulled up by the root in March. "It is also sown as a rainy season crop in sandy soils" (*Gar*, *Alif*, I, 290). This system has prevailed in

Or Hove, writing in
wrote to the height
d that it was sown
een gathered in "

In Kolaba it is
he stalks are up-
t and harvested in

December by being cut when the plants are full grown. In Poona it is sown in July and ripens in October. In the Central Provinces and the North-West Provinces it is a *kharif* crop, being sown with the advent of the rains, but in Bengal it is sown a little earlier, namely,—from the 15th April to 15th June, in Madras the sowings take place even still earlier. In the experiments performed at the Sardapat farm Madras, *sunn* was sown on the 2nd of February. In the *Ain-i Akbari* the plant is described

CULTIVA-
TION
2109

mean period of sowing is about the beginning of the rains (or in June),
it and occupies the soil for
in view of the possibility of
throughout the whole year
fect this varying period of
fibre produced. Indeed, it
other crops sown at two or
more seasons each year) there may be different cultivated forms of the
plant produced as the result of ancient cultivation. We are ignorant of
this subject, and it seems desirable that a thorough investigation should
be made. Although, as stated, everything points to *sunn* hemp being a

CROTALARIA
juncea.

History of Sunn-Hemp

FIBRE.

the name for gr
for the *kshaur*
it was made
made, the *patt*

lution in popular opinion took place until (as in the present day) *sana* and

seeing that, as far as
sypium (cotton) is tri
(*Book II*, 44) we have
of the Brahmin must l
strings, that of a Cshatriya of *sana* thread only, and that of a Vaisya of
woollen thread" It is believed that the substitution of cotton for the
sana has been carried, at the present day, to the extent of violating even
this injunction. Lisboa (*Bombay Useful Plants*, p 290) states "It

to be a wild state over the greater part of India there is little to justify
China, as
ia juncea,
appear to
be a native of India, and possibly also of Central Asia, many other

that on the plains of India the hemp plant does not produce more of any
value Unless therefore, we are to presume that it has degenerated, or
that the climatic conditions of India have altered, the ancient people of
the plains were not likely to have obtained their *sana* fibre from *Cannabis*
sativa

We may conclude this brief historic review of the hemp plants by
giving the opinions that prevail regarding the origin of our word "hemp."

Cultivation of Sunn-Hemp

CROTALARIA
juncea

Royle in his *Fibrous Plants of India* traces hemp from *sana*. Speaking of *sunn*-hemp he says: "Its name, Shanapam or Janapa on the Madras side, is not very unlike Canapa, Hampa, Hennip, and Hanf. From these we derive our own name 'Hemp'." In Mysore it is known as *sanabu* and in Ceylon as *hans*. On the other hand, the root of the word *an* or *ang*

FIBRE.

Greek and Latin, and *kannab* in Arabic.

CULTIVATION.

CULTIVA-
TION,
2109

Sunn is grown by itself or at times is cultivated in strips or around the margins of fields. It is never cultivated as a mixed crop. Throughout India as a whole it is a *kharif* crop,—that is to say, it is sown about the commencement of the rains and cut at the end of September or beginning of October. It is thus off the ground to allow of being followed by a *rabi* crop in the same year. But in some parts of India there are two crops of *sunn* hemp. Thus in the Ghana District of Bombay it is sown in November after the rice harvest, and the stalks are pulled up by the root in March. "It is also sown as a rainy season crop in sandy soils" (*Gaz.*, VIII, I, 290). This system has prevailed in Thana and Su-
1787, says—

stalks are uprooted in March. In Komapur it is sown in August and harvested in December by being cut when the plants are full grown. In Poona it is sown in July and ripens in October. In the Central Provinces and the North-West Provinces it is a *kharif* crop, being sown with the advent of the rains, but in Bengal it is sown a little earlier, namely,—from the

mean period of sowing is about the beginning of the rains (or in June), *sunn* hemp may be sown in almost any month and occupies the soil for 4½ to 5 months. This is an important feature in view of the possibility of securing a continuous supply of fresh fibre throughout the whole year. It remains to be ascertained, however, what effect this varying period of cultivation has on the quality and quantity of fibre produced. Indeed, it is probable that (as is the case with rice and other crops sown at two or more seasons each year) there may be different cultivated forms of the plant produced as the result of ancient cultivation. We are ignorant of this subject, and it seems desirable that a thorough investigation should be made. Although, as stated, everything points to *sunn* hemp being a

CROTALARIA

juncea

Cultivation of Sunn Hemp

CULTIVATION
OF
FIBRESoil
2110

native of India, it may be doubted if the plant has ever been found in a truly wild state. And the existence of distinct cultivated forms might not only help to confirm the opinions given of an ancient cultivation, but might also establish the superiority of certain crops over others for textile purposes. To what extent the form *C. tenuifolia* is cultivated is not known still less do we know how far it affords the superior *sunn* hemp referred to by writers on this subject.

Nature of the Soil recommended for Sunn hemp—It requires a light but not necessarily rich soil, and it cannot be grown on clay. It is therefore sown on the high sandy lands less suited for the more important crops. This is the opinion which prevails in Bengal, but Messrs Duthie and Fuller, writing of the North-West Provinces, say "Authorities differ as to whether a rich soil is necessarily required, and y in the soil is necessary to yet it cannot be contested that st any other crop. One pos- vory that plants of this order"

(the pea family) "can assimilate nitrogen direct from the atmosphere, and are hence less dependent on the soil for nourishment, and another explanation may be deduced from the fact that its roots penetrate deeper than those of most other crops, and can hence draw supplies from a larger body of soil." At the same time the practical experiments performed at the Saidapet farm, Madras, tend to prove that the plant would not produce so much fibre on rich as on poor soil. Speaking of these experiments Mr. Benson says "The seed germinated well, and the plants grew with great luxuriance, but when they had reached the time for cutting was a unfav

The soil of this plot ion and watering were cond experiment was performed, the seed being sown on "a light and very sandy loam recently levelled." The land was manured with "12 loads or about 4 tons per acre" of horse manure and the results were most favourable. In the *Mysore Gazetteer* it is stated that the best soil for *sannu* is the red or black used for *ragi* cultivation. Wisset remarks that clay soils are injurious, but that on a rich soil the fibre is c dry high situations. On the ot the cultivation in the Northern C is sown towards the end of the ra strong clayey soil suits it best.

Rotation
2111

Effects of Sunn Cultivation and the Rotation of Crops Pursued—It is all but universally believed by the Indian cultivators that *sunn*, like *grain* (see *Cicer*, C No 1067), improves the soil. In the *Bombay Gazetteer* (Kolhapur District, p 172) it is stated "As it is supposed to refresh the exhausted soil, it is considered a good *devad* or preparatory crop, and is grown as such every second or third year in some of the fields required for sugar-cane, tobacco, and other rich crops. Sometimes it is sown as a second crop and ploughed in when young as a green manure." From Poona it is reported that the leaves are considered "excellent manure." In gardens and occasionally in dry crop lands it is grown solely for manure, the plants being ploughed into the soil when ready to flower." The Director of Agriculture in Bengal states "It is considered by the people of the Lower Provinces to be a renovating crop, and is sometimes used as a green manure to enrich poor paddy land and land that has been infested with weeds." He adds "It comes after one of the pulses or mustard, and is followed by a pulse, sometimes by *shara* onions. When *sunn* is grown on good soil, it is sometimes followed by potatoes. It is not necessary to prepare the land well for *sunn*. Three or four

Cultivation of Sunn-Hemp.

CROTALARIA
juncea.

ploughings are sufficient " "Sometimes also paddy and *sunn* seeds are sown together in the same field. When the plants have properly grown, the field is lightly ploughed and the ladder (a kind of harrow) is passed over it. The paddy plants mostly recover themselves, but the tender and juicy *sunn* is buried underground and dies. A few *sunn* plants remain on the surface, but they are not of much use."

CULTIVATION
OF
FIBRE.

Messrs Duthie and Fuller say of the North-West Provinces "Ploughing in a green crop of hemp is known to add considerably to the fertility of the surface soil by increasing its stock of nitrogen, and it is extraordinary that this is not a general practice with native cultivators." In Bombay *tag* (*sunn*) is not considered a good green manure for wheat.

Tillage, Sowing, and Harvesting.—As indicated above, the opinion prevails all over India that high cultivation is not necessary for *sunn*-hemp. Of Kolaba (*Bomb Gas*, XI, 97) it is said "The soil is roughly ploughed twice and the seed sown broadcast." In Bengal "the seed broadcast. It is necessary become bushy and coarse."

TREATMENT.
2112
Bombay.
Bengal,N-W Provin-
ces

Madras,

o plots and watered twice
ombatore, by Nicholson,
allowed no manure, and

the seed is sown broadcast on the ground, without any previous cultivation, at the season when the rains become what the natives call *male*,—that is to say, when they become heavy. After being sown the field

Mysore.

SEED per
ACRE.
2113

eighty to a hundred pounds weight to the acre were used in the same way."

CROTALARIA
juncea.

Production and Cost of Sunn-Hemp.

CULTIVATION
OF
FIBRE.
Left standing
for a month
Steeped at
once.

these are supposed to injure the colour of the fibre it allowed to rot in the water of the tank. With regard to *sunn* hemp, the general rule may be almost safely laid down that in moist regions, like Bengal, rapid submer- sion is preferred, and in dry regions, like Madras, stacking the crop is preferred. Bayburn, from actual experiments arrived at the opinion

hand, states that the strongest opinions have been expressed in favour of first drying the plants before retting, the probability being, as indicated above, that both theories are correct, but applicable to different climatic

Fibre not
removed
from bark till
required.

PRODUCE
2115

THE PRODUCE PER ACRE.—Is so variously stated that it is feared little reliance can be put on the figures. Wisset says that it varies from 3 cwt.

640 lbs per
acre.

In the Kolhapur District the average acre outturn of experiments made at the flower, cut level with the ground, on the 4th December 1880, was 112 lbs; on the same day 325 lb, on the 14th 487 5 lb; and on the 24th 5 lb. The average given by Wisset is thus most likely to be a high one and the Kolhapur returns incorrect. Duthie and Fuller say of the North-West Provinces. "The average outturn is about 8 maunds (or 640 lb) of clean fibre to an acre, worth about Rs 20."

COST
2116

Duthie includes in the cost as "The net re-

that in 1877 its price was as high as 6 seers (12 lb) per rupee, whilst a few years ago it was only 12 annas per maund.

Area under Sunn-Hemp

CROTALARIA
juncea.

acre The produce was sold by the cultivators to the Telinga Chitties or manufacturers by the thousand handfuls of the dried stems, tall plants fetched two rupees per thousand handfuls, and short plants a rupee and a half. But another crop, he says, was sown in January. This crop had to be watered and more labour spent upon it, but the produce was more valuable. An acre, he says, required $4\frac{1}{2}$ bushels of seed, and its produce was sold for about £1 25 10½d.

AREA UNDER SUNN-HEMP.—As may be inferred from what has been stated regarding the ambiguity in the Indian literature of this subject, it is next to impossible to discover the extent of sunn-hemp cultivation. Messrs Duthie and Fuller, from special returns furnished for their *Field and Garden Crops*, state that in the North-West Provinces there are about 40,000 acres under the crop. But in the *Land Administration Report for 1885-86* (page 163 A) it is stated that there were 198,728 acres under "Sana or Til (sic)." But it is further remarked that the total area under "fibres other than cotton and jute" was in that year only 123,403 acres. This last return would include hemp (proper) *sana* and *Hibiscus cannabinus*. The Settlement Reports of Oudh show about 800 acres under *sana*. In *Spon's Encyclopædia* it is stated that there are 50,000 acres in the Panjáb. It is not known from what source that statement was derived, but it seems highly in-

than in the North
about 40,000 acre
hemp plant, how
as sunn hemp, it

acres of brown hemp (*Crotalaria juncea*) grown in Bombay. Full particulars regarding Madras cannot be obtained, but of the districts for which returns are available there were last year 775 acres under "sunn" and 83 acres under "Bombay hemp." What this Bombay hemp may be cannot be learned, but in most works on the subject Bombay hemp is a synonym for sunn-hemp. In 1834-85 there were 380 acres of "Bombay

hemp" in the Central Provinces there were 24,800 acres under "False or San hemo" and in Mysore under "hem" explains the former

lana juncea. In Burma and Assam there are about 500 acres, in each province, of land entered as under "fibres other than cotton and jute." No returns are available for Bengal, but from personal observation the writer would be disposed to think there must be as much in the Lower, as in the North-West Provinces.

It will thus be seen that the actual area under sunn-hemp cannot be absolutely determined, since the fibre is not included among the agricultural products regarding which regular annual statistics are furnished. But it seems probable that there are at least 150,000 acres annually under the crop in India as a whole.

SEPARATION OF THE FIBRE
The question as to whether the plant should or should not be dried before being placed in the retting tanks having been discussed above, there remains to be given here a brief account of the various modes of retting or of peeling the fibre and of cleaning and boiling it after it has been separated from the stems. In some localities the stems are recom-

SEPARATION
OF
FIBRE.

AREA.
2117
N. W. P.
40 000 acres.

Panjab
50 000 acres.

Bombay
26 814 acres.

Madras,
Travancore.

C. P.

"

Burma
500 acres.
Bengal,

India
150 000 acres.

SEPARATION
2118

CROTALARIA
juncea

Methods of separating sunn-Hemp Fibre

SEPARATION
OF
FIBRE.

mended to be buried in the mud at the margin of the tanks, in others, to be submerged in the water by being weighted. In others stagnant water is condemned as destroying the colour and lustre of the fibre, running streams being urged as preferable (*Gibson's account of the Bombay fibre*). But practical and comparative experiments not having been performed in the other provinces similar to those made at the beginning of the present century by Roxburgh, in Bengal a definite opinion for or against the different methods pursued cannot be offered. After removal from the ground, the stems are tied in bundles (20 to 100 in each), but the leaves are generally stripped off and left on the field. When the stems are left until quite dry, the leaves either fall off naturally or are removed by the stems being beaten. It is a common practice to place the bundles of stems erect in 2 or 3 inches of water for 24 hours, so as to give the thicker and lower ends a longer submersion. But the length of time required for retting depends largely on the temperature

Leaves
strippedLength of
submersionStems placed
erect in
water then
horizontal.

laid down lengthways in the water and are kept submerged by being weighted with earth. The time required for retting varies from three days

mentation, while it whitens the fibre, injures its strength. Roxburgh,

"All that seems necessary is to caution the plant, which they are apt to do the bark from the stalks easier, but clear water, well exposed to the sun's

beams, seem best suited for steeping in, because heat hastens maceration, consequently preserves the strength of the fibres, while the clean water

Deep water
Running
water

Damp Mud

the margins of tanks, referred to by some, is even more objectionable, as it seems impossible to adopt this mode of retting without serious loss to the colour of the fibre.

Cleaning of
Retted Fibre

Having discovered the method of retting, the cultivator, of the stems in his gives way and the

being partially washed, to dry for some hours. This practice, while it is

fibre has been separated and approximately cleaned

In Salsette Island and other parts of Bombay, little or no retting is

Cleaning Sunn-Hemp Fibre.

CROTALARIA
juncea.

employed "The plant while moist is peeled by the hand, and immediately, dried in the open air or under cover, according to the state of the weather. By peeling, the fibres are better kept in their natural state of arrangement, and give support and strength to each other, whereas, by the process of the Bengalese, they get so materially entangled that a great loss is always sustained. If they are restored to their natural situation by the heckle, there is a loss of nearly one half of the original quantity, which renders the heckled *sunn* of Bengal of a high price" (Royle) The writer cannot discover any recent description of this Bombay process of separating the fibre without retting, but, as Roxburgh stated, the superior quality of Bombay over Bengal *sunn* hemp seems likely to be due to the fact that the fibre has not been subjected to strong fermentation.

Washing the fibre is very tedious, and a man rarely works for more than three hours at a time but is relieved by turns, he will clean 15 seers a day, which represents the fibre obtained from 5 or 6 maunds of stems. Of Khandesh it is said a man earns Rs 1 for cleaning 40lb of fibre.

Reference has incidentally been made to the period when the crop should be cut, and before proceeding to discuss the further treatment of the fibre it may be as well to add here that the period of cutting will depend on the time of the year. A softer and more just as the flowers appear. A few plants are always left by the cultivators to mature seed for the next year's crop, and from the stems of these they extract a strong, though coarse, fibre. On the other hand, it seems to be the habit of some cultivators (the Wunjaras of Bombay) to allow the whole crop to ripen its seeds, this coarse fibre being all they desire, together with the seeds, which are valued as a food for buffaloes. Old cotton is also used for the same purpose.

SEPARATION
OF
FIBRE.
Not Retted.

Wages for
cleaning.

Period of
cutting.

Soft fibre.

Strong Coarse
fibre

Seed used as
buffaloe food

FURTHER
CLEANING.
2119

required for textile purposes
e.g., ropes and twine—it
while hanging over the
receives all the treatment
growers as "breaking"
cleaning is never used
fibre that the Native gen
separation from the stem

quotes a report of a sample of *sunn* hemp experimented with at Hull of which it was stated that "by using more care in the steeping and exposure, it will be fully equal to the Baltic." Such opinions are current in the reports of this fibre which appeared while the error existed of supposing it to be Indian grown hemp or *Cannabis sativa*. It is impossible to avoid the impression that *sunn* hemp fell into disfavour when this error was exploded. An expert in 1842, for example, says "Your hemp is very clean—a material point—but it wants more beating and dressing, and I think the natives have not proper implements to do it with. You cannot improve in your mode of packing, it is decidedly superior to the Baltic. I do not despair of seeing the produce of the Baltic supplanted by that of India, as that defect appears to me solely to arise in the management of it—it stands too long before it is pulled or cut, or is too much steeped or exposed, to get the fibre to separate from the stalk." Unfortunately, the advances of scientific exploration told all such writers that the defects they complained of were due to the fact that Bombay hemp was not hemp at all, and instead of the fibre supplanting

Breaking.
Scutching

Said to be
nearly as
good as Baltic
Hemp.

CROTALARIA
juncea.

Properties of Sunn-Hemp

PROPERTY OF
FIBRE.
2120

the Baltic hemp it is to-day in the same position commercially as it was a hundred years ago. While not hemp, it is a hemp substitute that deserves a better position than it has as yet obtained.

PROPERTY AND STRENGTH OF SUNN HEMP

£35 a ton

of the fibre by growing and manufacturing it carefully, and Royle mentions a sample of heckled fibre sent to London by the Company that

EARLY
RECORDS.
2121First
Exported.

1791-92. Although numerous favourable reports appeared shortly after this date, the whole interest in the fibre gradually died out, and the

No	Names of the Plants.	Average weight each line broke with when dry	Average weight each line broke with when wet	Average weight gained by wet- ting the lines
4	Sunn (<i>Crotalaria juncea</i>) cut before the plants were in blossom and steeped immediately	112	158	41
5	The same as No 4, but dried, or rather kept some time before they were steeped	60	78	30
6	Sunn cut when in full blossom, and steeped immediately	130	185	42
7	No 6 kept drying for some time	100	166	66
8	Sunn, winter crop cut when the seeds were ripe and steeped immediately	150	201	35
9	The same as No 8, but dried	110	163	48
10	Sunn, winter crop cut when the seeds were ripe, and steeped immediately	160	209	31

Properties of Sunn-Hemp

CROTALARIA
juncea

No	Names of the Plants	PROPERTY OF THE FIBRE.		
		Average weight each line broke with when dry.	Average weight each line broke with when wet	Average weight gained by wetting the lines
1	W. & A. Co's	158	190	20
2	"	248	343	38
29	Bahmeria nivea) allot,	240	278	16

but the new trade is from Bombay, not Bengal

Roxburgh tried the properties of sunn hemp in another way in order

Roxburgh's

NAMES OF THE PLANTS	AVERAGE WEIGHT AT WHICH EACH SORT OF LINE BROKE					
	When Fresh			After 110 days maceration		
	White	Tanned	Tarred	White	Tanned	Tarred
English hemp, a piece of new tiller rope	105			Rotten, as was also the English log line		
Hemp from the Company's farm near Calcutta	74	139	45	All rotten		
Sunn hemp of the Bengalese	68	69	60	rotten	51	65
Jute (<i>Burgha pidi</i>)	68	69	61	40	42	60

CROTOLARIA
juncea.

Properties of Sunn-Hemp

PROPERTY
OF THE
FIBRE.Deterioration
with age.Removal of
Export Duty

According to these experiments *sunn* hemp stood the action of the maceration better than did either of the samples of true hemp. It has further been shown that a cord 8 inches in size of best Petersburg hemp broke with 14 tons, 8 cwt., 1 qr., while a similar rope of *sunn* only gave way with 15 tons, 7 cwt., 1 qr. Dr. Wight found that a rope of coir of a certain thickness broke with a weight of 224lb. of cotton with 346lb. of American aloes with 362lb. of *sunn* hemp with 407lb. of *Calatropis gigantea* with 552lb. and one of Ambári (*Hibiscus cannabifolius*) with 290lb. Royle has shown the slight deterioration which *sunn* hemp undergoes in the following statement: "A rope made in 1803 broke with a weight of 6 tons 2 cwt. 3 qrs. whereas a rope made in 1804 broke with a weight of 6 tons 2 cwt. 3 qrs. 1 lb."

In the nineteenth century the bulk of the exports of raw hemp (*sunn* hemp) went from Bombay and not from Bengal, in spite of the efforts made a few years before that date to create a Bengal trade. This would seem to point to a superiority possessed by the Bombay as compared with the Bengal *sunn* hemp. It seems probable that had this fact been realised by the East India Company, their efforts to establish an Indian hemp industry would have been more successful than was the case with their attempts in Bengal.

In a Report on the Indian Fibres by Cross, Bevan, King, and Watt, recently published by E. and F. Spon, the following passage occurs: "It is impossible to urge too strongly the claims of this much-neglected fibre—a fibre which seems to have suffered severely through the immense

that so little of the better qualities of *sunn*-hemp were procurable. Mr. Goffier and several other Brokers and Merchants stated that their only

Future Pros-
pects.

Chemical Properties of Sunn

CROTALARIA
juncea

actual experiment not to be the case, then there must be something in the climate or soil of Madras and of Bombay more favourable to *sunn* hemp than exists in Bengal

FIBRE

CHEMICAL AND MICROSCOPIC PECULIARITIES OF SUNN

2123

soda, it loses 8.3 per cent, and after an hour only 11.7 per cent. Among Indian fibres it occupies the third or fourth place in point of amount of cellulose. According to this classification Girardinia or Nilgiri nettle heads the list with 89.6 per cent, then Marsdenia with 88.3 and after that *Crotalaria juncea* and *Sida rhombifolia* equal, each with 80.0 per cent of cellulose. "The percentage yield of cellulose of the raw fibre is the most important criterion of its composition and value." It may be worth

Percentage
of cellulose

Europe, there still remains the practical fact that, under the crude methods adopted in India, they are valued as strong and durable fibres. It will be received with no small surprise by many that so humble a position should be assigned to the famed Poya fibre of Assam, and thus in concluding these remarks a possible explanation may be sought in the mode of hydrolysis (or washing and bleaching) employed. The Poya was found to lose 62.7 per cent by being boiled in caustic soda the residue being the cellulose upon which the low opinion of its properties is based. May it not

retains all its properties and under nitration attains a great weight (150.5) being in this respect third in the list of the Indian fibres experimented with by Messrs Cross and Bevan. A writer in *Spon's Encyclopaedia* says of *sunn* hemp: "Samples of the fibre, exposed for two hours to steam

Trade in Sunn-Hemp

at 2 atmospheres, boiled in water for 3 hours, and again steamed for inst six, 350; Mamliti (without the aid of an in point of durability under moisture and under caustic alkali processes of washing and bleach-

The map shows the northern Adriatic coastline from Trieste in the northwest to the Gulf of Genoa in the southeast. Sampling stations are indicated by numbered dots. Station 1 is located near Trieste. Station 2 is further east along the coast. Stations 3 through 15 are distributed along the coast and in the Gulf of Genoa. A scale bar at the bottom indicates a distance of 100 km.

mean, 0.0015 in. These measurements are in round numbers double

by the process of drying before retting.

TRADE IN SUN HEMP.

Little or nothing can be learned of a definite nature regarding the extent of the trade in this fibre. It is grown in every province, and nearly universally used by the people of India; but, as already stated, definite information in the use of the fibre is not available. Another, and true, same reason we are

[illegible]

* Presumably ~~some~~ hemp or ~~some~~ hemp along with a certain amount of the fibre of ~~the~~ *H. bisulca canadensis*—*angul* or *umbell*ids.

Imports and Uses of Sunn-Hemp.

CROTOLARIA
juncea

FIBRE.
TRADE IN.

factured Hempen Goods other than cordage. This continued to expand until, in 1870-71, when it was valued at Rs. 64,433, of which Bengal had assigned to it Rs. 53,330. The bulk of these exports went to the Straits Settlements, Ceylon, and Mauritius. From 1871-72, this trade began, however, to steadily decline, and in 1874-75 was valued at

Hempen
Goods.
2127

Ropes and
Cordage
2128

the bulk of the raw fibre so reported may be the Manila hemp used up in the Indian rope factories and of the hempen goods. The bulk of the fabrics of true hemp

Imports.
2129

7641 cwt. of hemp

USES OF
2131

Canvas.
2132

CROTOLARIA
juncea.

Trade in Sunn-Hemp

CHEMISTRY
of the
FIBRE

at 2 atmospheres, boiled in water for 3 hours, and again steamed for
 10 minutes at 100° C. The weight of the fibre was 2.50 Manilla
 2.00

MICROSCOPIC
FORM
2124

Mr. King, who worked out the microscope, found that the fibre bundles con-

luded
 in
 He con-
 ell marked
 nm, ends
 in Spous
 e with the
 plant may
 tent He
 in, min,
 oot in,
 rs double
 ility of the
 aving samples of
 pared It would
 - - - - - made

Re-examina-
tion desira-
ble.

maturity of seed, b
 by the process of drying before retting.

TRADE IN SUNN HEMP

TRADE.
2125

Little or nothing can be learned of a definite nature regarding the
 extent of the trade in this fibre. It is grown in every province, and
 nearly universally used by the people of India, but, as already stated,
 the confusion which exists
 ase, Hibiscus in
 ed to) For this
 foreign trade in
 ports to foreign
 whole of

Exports
2126

* Presumably sunn hemp or sunn hemp along with a certain amount of the blue
 Hibiscus cannabius—sarpal or sambada

Imports and Uses of Sunn-Hemp.

CROTOLARIA
junceaFIBRE,
TRADE IN.Hempen
Goods,
2127

Straits Settlements, Ceylon, and Mauritius. From 1871-72, this trade began, however, to steadily decline, and in 1874-75 was valued at

probable that this native industry may have been ruined by the remark-

Ropes and
Cordage
2128Imports
2129

in the Indian rope factories
fabrics of true hemp
764½ cwt of hemp f

hemp from all Indian ports to other Indian ports, and these are returned as valued at Rs 24,303, the trade having steadily increased since 1882-83, when it was valued at Rs 6,087.

USES TO WHICH SUNN HEMP IS PUT.—The chief purpose for which this fibre is utilised at the present day is the manufacture of a coarse cloth (*lat puti*) or canvas used chiefly for sacking. A large amount of the fibre

USES OF
2131CANVAS
2132

CROTALARIA
juncea

Uses of Sunn-Hemp.

FIBRE
Paper
2I33

paper is regularly made of this material, and large quantities are annually used up by the Indian paper-mills. The paper made by the natives of Bombay is principally of *sunn*. The paper made by the natives of is a common mixture. In S regarding *sunn* paper " "

paper, weighing 39 grs, made from "raw" fibre, was 14lb, as compared with Bank of England note pulp, 47lb. One batch was reported to make a nice, clean, smooth paper, of good colour, but not taking ink well."

For European purposes the fibre may be used as a substitute for hemp or for flax. Speaking of the special form of the fibre produced in Travancore, Dr Royle says "The appearance of this fibre is totally different from any other which comes from India, as it is in the state as if prepared for spinning into thread, and must have been combed or heckled. The fibres are brownish in colour, about 3 to 4 feet in length, clean and shining, not so fine as flax, but still resembling some of the coarser kinds. A very competent judge informed the author that it might be sold for the purposes of flax, or as a kind of flax, and was worth £35 a ton, so some specimens sent to Dundee were valued at the same sum, and it was said could be used for the same purposes as flax, though rather too dry." So, again, "This hemp, when prepared with the patent liquid, became soft, white, and so fine when heckled as to bear the closest comparison with flax at £80 per ton. It is better than any Russian flax for fine spinning. Bombay hemp, rough and dark, and valued at £20 per ton. This article, being similarly prepared, was considered equal in value with the Madras hemp."

Sunn stalks (after removal of the fibre) are used chiefly as fire-wood. But of the Kolaba district, Bombay, it is stated "Hemp torches are stalks with hes round, into about

STALKS
2I36

Torches

2I37

Matches

2I38

C. P. Fibre.

2I39

Bengal

2I40

Bombay

2I41

Madras

2I42

N W P.

2I43

Immediate

Process

2I44

Deferred

Process

2I45

as well to e obtained tter being the fibre most probably of the form known as *Crotalaria tenuifolia*) as superior to the ordinary *sunn* hemp. We possess so little definite knowledge regarding the cultivated forms of the *sunn* plant that it can only be

mination Were such specimens to be accompanied with samples of the

s of ret- s where sible to courage

the natives to adopt the process of preparation of the fibre which was

s of *Crotalaria* ighly probable

Sunn-Hemp-yielding Plants

CROTALARIA
retusa

Food and Fodder —It has already been incidentally remarked that in some parts of India the seeds of this plant are collected and given to cattle. Roxburgh says "This plant—and it is the only one—is also cultivated by the natives of some parts of the Northern Circars to feed their milch-cows with during the dry season I have found that it is

FODDER

Seeds
2146MEDICINE
Seeds
2147*Crotalaria laburnifolia*, Linn, *Fl. Br. Ind.*, II, 84

2148

A shrubby plant met with in the Western Peninsula, particularly in the South Concan. Properties similar to those of the next species. It is known in Hindustani as *muna*, the *pedda-galli gista* of Telugu. Sir Walter Elliot gives it the further Telugu name of *Churi giligichcha*, and the plant is often seen in gardens on account of its flowering throughout the year.

C. Leschenaultii, DC, *Fl. Br. Ind.*, II, 76

2149

ns of the
ant used
zell and
Satara
Paper
2150*C. medicaginea*, Lamk, *Fl. Br. Ind.*, II, 81

2151

Vern —*Gulabi*, Ps

A diffuse perennial abundant in the tropical regions of India from Kashmir to Burma, ascending to 6000 feet in altitude.

Medicine —This plant is officinal in the Panjab being sold in the bazars under the name of *gulabi* (*Biden Powell, Pb. Pr.*, 343).

MEDICINE
2152*C. prostrata*, Roxb, *Fl. Br. Ind.*, II, 67

2153

A slender creeping weed, common on the drier plains of India ascending to 6,000 feet.

This is known by them it is used known in Bengal as Roxburgh says this

2154

C. retusa, Linn, *Fl. Br. Ind.*, II, 75

2155

form of sunn hemp
may be passed of

FIBRE
2156

instructive to possess definite information as to the comparative value and property of this fibre with the true sunn-hemp. In Bengal it is

C. 2156

The Croton

CROTON
Joufra.

CROTON, Linn, Gen Pl, III, 293

2165

The generic name *Kpōrōw* (a tick) was given by LINNÆUS to this assemblage of plants in allusion to the shape of the seed. The chief medicinal

..
..
..

Croton argyratus, Bl, Fl Br Ind, V., 383, EUPHORBIACEÆ

2166

Syn — C BICOLOR, Roxb

Vern — *Chonoo*, BURM, *Talib da*, AND

References — Roxb, Fl Ind, Ed C B C, 687 Gamble, Man Timb, 359 Kurz, For Fl Burm, II, 372

Habitat — A moderate sized or small evergreen tree of Martaban, Tenasserim, and the Andaman Islands

Structure of the Wood — Hard, yellow, close and even-grained, seasons well It is worthy of notice and weighs 46 to 48 lb per cubic foot

TIMBER.

2167

C. aromaticus, Linn, Fl Br Ind, V, 388

2168

Syn — C LACCIFERUS, Linn, ALEUBITES LACCIFERA, Willd

Vern — *Welkeppitiya*, SING, *Vid punda*, TAN (names used in Ceylon for C. aromaticus, the form C. laccifera being *Keppitiya* in SING)

References — Beddome, Forester & Man, 204, Wight, Ic, t 19 15, Lisbon, U Pl Bomb, 121, Trimen, Cat Ceylon Pl 81; Gamble, Man Timb, 359, O Shaughnessy, Beng Disp, 553

Habitat — An aromatic shrub or small tree, met with in the Dekhan from the Concan southward

Medicine — Said to be used medicinally Thwaites remarks that the lac obtained from C. lacciferus "is employed by the Singalese for medicinal purposes."

MEDICINE

2169

Lac

2170

2171

C. caudatus, Geisel, Fl Br Ind, V, 388

Syn — C DRUPACEUS, Roxb

Vern — *Nan bhantur* BHO *Takhabrik*, LECHA, *Wusta URIYA*

References — Roxb, Fl Ind, Ed C B C 688 Vingt, Hort Sub Cal, 156, Kurz, For Fl Burm II, 375 Gamble, Man Timb 359-359 and XVI

Habitat. — A large straggling, more or less scandent shrub of Bengal Assam, Burma, and South India, found chiefly on the banks of streams Roxburgh states that it is a native in the country about Dacca, and flowers in March, the seeds ripening in September

Medicine — Mr Home Conservator of Forests, writes, the leaves are applied as a poultice to spruns

Structure of the Wood — White or yellowish-white, hard, close grained Home says it is used for fuel

MEDICINE.

Leaves

2172

TIMBER.

2173

2174

C. Eluteria, Bennett, affords Cascarilla Bark, — an imported drug

C. Joufra, Roxb, Fl Br Ind, V, 387

2175

Vern — According to Roxburgh *Joufra* is in Sylhet the name of this small tree or shrub

C. 2175

CROTON
oblongifolius.

The Oblong-leaved Croton.

References.—*Kurz For Fl. Burm.*, 11, 373; *Gamble, Man. Timb.*, 358, *Medical Top. Ajmer*, 140, *Voigt, Hort. Sub. Cal.*, 156

Habitat.—A small shrub very similar to *C. oblongifolius*, but with smaller more acuminate leaves, met with in the Eastern Peninsula—Sylhet, Sibsagar, Pegu, Upper Burma, &c. Flowering time March and April

MEDICINE
2176

Medicine.—Like most other species, the leaves, seeds, and root of this species are occasionally spoken of as used medicinally.

2177

Croton lacciferus, Linn, a form reduced to *C. aromaticus*, Linn, by the *Flora of British India*,

2178

C. malabaricus, Beddome; *Fl. Br. Ind.*, V, 386.

References.—*Beddome, Ic.*, t. 171, & *Forester's Man.*, 204; *Gamble, Man. Timb.*, 359, *Lisboa, U. Pl. Bomb.*, 121.

Habitat.—A small tree common in the western forests, ascending to 4,000 feet in altitude, Malabar, &c.

MEDICINE.
2179

Medicine.—Said to be used by the natives of India for medicinal purposes.

2180

C. oblongifolius, Roxb; *Fl. Br. Ind.*, V, 386.

Vern.—*Chukka*, PATNA (according to Irvine), *Bara gach*, BENG (accord-
Kurti,
Kote,
1887,

References.—*Fl. Br. Ind.*, V, 386; *Fl. Br. Ind.*, V, 386; *Fl. Br. Ind.*, V, 386;

Habitat.—A small tree found in the sub-Himalayan tract from Oudh eastward and in South India, the Deccan Peninsula, Burma, and Ceylon. Roxburgh remarks that it is common in the forests about Calcutta,

OIL
2181
MEDICINE

leaves, and fruit are used
are purgative; Dr Irvine

Seed
2182
Fruit
2183
Root-bark
2184

Root.
2185

"bark and root as a purgative and as an alterative in dysentery."
It would appear that the early writers on *Hindu Materia Medica* do not allude to this plant, and many of its vernacular names would point to

C. 2185

The Purging Croton

CROTON
Tiglium.

the properties having been but recently understood There is no good Hindi nor a Bengali name for the plant It is not referred to by U O Dutt nor by Ainslie, and while Roxburgh describes it he makes no mention of its medicinal products On the other hand, there is nothing to justify a

by European writers

Structure of the Wood.—Whitish to yellow, close-grained, moderately hard and heavy, liable to crack in seasoning.

Domestic Uses.—The plant is frequently employed for fences

TIMBER.

2186

DOMESTIC.

2187

2188

Croton polyandrus, Roxb, see under *Baliospermum montanum*, Muell, Vol I, B 28

Hooker, in the *Flora of British India*, V, 461, reduces this to *B axillare*, Blume Consult also O'Shaughnessy's *Bengal Dispens*, 555. U C Dutt's *Mat Med of the Hindus*, 229, and Dymock's *Materia Medica*, West Ind, 2nd Ed, 688, the last work has appeared since the issue of the 1st volume of this publication

C. reticulatus, Heyne, Fl Br Ind, V, 386

2189

Syn — *C. HYPOLEUCUS*, Dals, *C. ZEYLANICUS*, Muell - Arg

Vern — *Pándhars* or *pandharisale*, MAR

References — Dymock, *Mat Med West Ind*, 2nd Ed 684, S Arjun, Bomb Drugs, 121 Thwaites, *En Ceyl Pl*, 276, Dals and Gibs, Bomb Fl, 231, Lisboa, U Pl Bomb, 121

Habitat — A shrub with slender branches, met with in the Dekhan Peninsula from the Koncan southwards, distributed to Ceylon

Medicine — Sakharam Arjun says the bark is "used as a bitter and stomachic"

MEDICINE

Bark

2190

2191

C. sebiferum, Linn, and *Sapium sebiferum*, Roxb, are synonyms for *Stillingia sebifera*, the Chinese Tallow Tree This is now cultivated to some extent in India, and, according to Roxburgh, is known in Bengal as *Momchima*

C. Tiglium, Linn, Fl Br Ind, V, 393.

2192

THE PURGING CROTON

Syn — *C. PAVANA* (or *PARANA*) Hamilton

Vern — *Jayap ila kanakaphala* (in Ainslie dunt, bija) SANS, *Jaypal*

References. — Roxb, Fl Ind, Ed C B C 688 Voigt, Hort Sub Cal,

CROTON
oblongifolius.

The Oblong-leaved Croton.

References.—*Kurs, For. Fl. Burm.*, II, 373; *Gamble, Man. Timb.*, 358; *Medical Top. Afmr.*, 140, *Voigt, Hort. Sub. Cal.*, 156.

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MEDICINE
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2177

Croton lacciferus, *Linn.*, a form reduced to *C. aromaticus*, *Linn.*, by the *Flora of British India*.

2178

C. malabaricus, *Beddome; Fl. Br. Ind.*, V., 386.

References.—*Beddome, Ic.*, t. 171, & *Forester's Man.*, 204; *Gamble, Man. Timb.*, 359, *Lisboa, U. Pl. Bomb.*, 121.

Habitat.—A small tree common in the western forests, ascending to 4,000 feet in altitude; Malabar, &c.

MEDICINE,
2179

Medicine.—Said to be used by the natives of India for medicinal purposes.

2180

C. oblongifolius, *Roxb.; Fl. Br. Ind.*, V., 386.

Vern.—*Chuka*, PATNA (according to Irvine); *Bara gach*, BENG (according to Brandis = large plant), *Arjunna*, OUDE; *Ach*, NEPAL; *Kurti*, *konya*, *kuli*, *poter*, KOL; *Putri*, LOHARDUGGA; *Goto*, SANTAL; *Kote*, *gulol*, MAL.; *Burma parokupi*, ASS; *Bhutan kusam*, TEL; *Gonsur*, GOA, *Ganasur*, BOMB; *Ganasura*, MAR; *Thulyin*, theyin, BURM.

References.—*Pl. Br. Ind.*, V., 386; *Fl. Br. Ind.*, V., 386; *Fl. Br. Ind.*, V., 386.

..
..

Habitat.—A small tree found in the sub-Himalayan tract from Oudh eastward and in South India, the Deccan Peninsula, Burma, and Ceylon. Roxburgh remarks that it is common in the forests about Calcutta,

OIL
2181
MEDICINE

leaves, and fruit are used
are purgative; Dr. Irvine

Seed
2182
Fruit.
2183
Root-bark
2184

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ble
ed
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to
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Root.
2185

"bark and root as a purgative and as an alterative in dysentery."

It would appear that the early writers on Hindu Materia Medica do not allude to this plant, and many of its vernacular names would point to

C. 2185

[illegible]

CROTON
Tiglium.

The Purging Croton

and *Arboreum*, 67, *Simmonds, Trop Agri*, 424

It is a small tree (up to 20 feet high) with the bark of the stem

OIL
Nuts.
2193

Bombay
2194
Cochin
2195
Chinese.
2196
European
Expressed
2197

nuts are exported chiefly from Bombay and Cochin (often being also Chinese re exports), and the oil is expressed in England. Dr Dymock informs the writer that the oil is expressed at the Government Medical Store Depot at Bombay. It costs about 12 annas a lb., whereas in 1825, the same oil was sold for about 10 shillings an ounce in England. The plant used to be grown for the purpose of its seeds at Hewra, but the supply is now imported from China *via* Singapore. The nuts sell for Rs1 per maund of 4 lb.

It is necessary to be cautious in handling the nuts or the oil, owing to their blistering the skin. The oil is frequently used for colds in the chest as an external application, causing a severe blister. It is much resorted to as a domestic cure but is not recommended by the profession.

§ "The drastic principle of the oil has not yet been isolated, it appears to exist not only in the seeds but also in the leaves and wood" (*Professor Warden, Calcutta*)

MEDICINE.—The SEEDS are used as a powerful drastic purgative, and the OIL is regarded as a valuable medicine. In overdoses they act as an acro narcotic poison. When externally applied the oil is a stimulant rubefacient and counter-irritant. Croton oil is said to possess powerful hydragogue cathartic properties. It is also useful in dropsy, obstinate

MEDICINE
Seeds,
2199
oil
2200

2201

fever, constipation, intestinal worms, enlargements of the viscera, ascites, anasarca, &c."

C. 2201

The Purging Croton

CROTON
Tigilium.MEDICINE.
Grana Tiglia.
2202

opinions of a few Indian medical officers who re-made known the properties of this drug at about the beginning of the present century or the close of the last. Practically all subsequent writers have but slightly altered the

2203

biting the oil at first in larger doses than one or two minims, to adults,

the oil highly useful as an emmenagogue

"Rumphius informs us that the root of the plant is supposed, by the inhabitants of Amboyna, to be a useful drastic purgative, in cases of dropsy, given rasped in doses of a few grains, or as much as can be held between the thumb and finger" "Rheede, who speaks of the plant under the name *caddi avanacu*, says, that the leaves rubbed and soaked in water also are purgative, and when dried and powdered are a good external

Root
2204Leaves
2205

2207

their uses as a drastic purgative the seeds are applied in the form of liniment to the penis in cases of impotence and have a high reputation in this disease amongst the natives" (Lal Mahomed, 1st Class, Hosp'l. Asstl,

C. 2207

CROTON
Tiglium.

The Purging Croton

Habitat—A small tree (15 to 20 feet high) met with under cultivation throughout the greater part of India, probably indigenous or only naturalised in Eastern Bengal and Assam and southward to Malacca, Burma, and Ceylon.

OIL
Nuts.
2193

Bombay
2194
Cochin
2195
Chinese.
2196
European
Expressed
2197

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2198

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MEDICINE
Seeds.
2199
Oil
2200

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2201

The Purging Croton

CROTON
Tiglium

MEDICINE
Grana Tiglia,
2202

tion, they have been long banished from modern practice For the same

2203

biting the oil at first in larger doses than one or two minims to adults,

the oil highly useful as an emmenagogue

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Root
2204

Leaves
2205

tion and drops
tion, amount
boils in Benga
Shib Chunder

CROZOPHORA
plicata.

The Indian Turnsole.

MEDICINE.
2208

Mans Dispensary, Hoshangabad, Central Provinces) "The seeds, half roasted over a lamp or candle flame, and the smoke inhaled through the nostrils, relieves a fit of asthma." (C. I. E., Madras) "I used oil or olive oil to (Dojil Chunder Shro rubeficient" (D. Pic.) is frequently applied (Surgeon-Major Robb, Civil Surgeon, Ahmedabad)

2209 *Croton tinctorium*, Turnsol, see *Crozophora* (*Chrozophora*) *tinctoria*, A. Juss.

Crown Bark, see *Cinchona Condaminea*, Huml., RUBIACEAE C. 1129.

2210 CROZOPHORA, A. Juss.; Gen Pl, III, 305

error in the spelling of the name
then arranging the material for
effect of placing it in the wrong
from γρωσω the word should of

course be *Chrozophora* as corrected by Necker.

2211 *Crozophora* (*Chrozophora*) *plicata*, A. Juss.; Fl. Br. Ind., V, 409, EUPHORBACEAE.

Syn.—C. ROTTLERI, A. Juss.; C. Plicatus, Willd.; C. ROTTLERI, Geisel, C. TINCTORIUS, Wall, Burm., C. Plicatum, Willd. (in Roxb., Fl. Ind.)

Vern.—Shadrei, saba's sonballi, Hind, Sind and Otharada, Glz., Khidi-ekra, Beng., Pango nari, Santali, Surjagarhi, Sans., Pál kunda, nilkharis, nilakrai, Ps.; Neal beti, Takk, Gurugu chettu, lingua miriyam, Tel.

References.—Roxb., Fl. Ind. Et. C. B. C., 657, Thwaites, En. Ceylon Fl., 443, Dalz. & C., Fl. Andhra 66, Chulia Dacpur, 19 W. Ind., 2nd ed.

Si. . . is the Indian Turnsol—Wilson, Brown, Piddington, and others have imagined the plant to be the sun flower, and still further to increase the confusion, they have turned the old Greek name *Chrozophora tinctoria*, L. (*ἡ χροσφοριον μικρον*) into the modern *Heliotrope*, and explained the various Ind. names of *Croz plicata* by *Heliotropium* (*Tiadmum*), *Indicum*, *Len II*, *lee King*, p. 281. This mistake has been repeated by O'Shaughnessy, who says that *Chrozophora tinctorium*, the Turnsol (Turnsole) is the *ἡ χροσφοριον μικρον* of Dioscorides."

2212 **Habitat.**—There are two well marked forms of this plant—(1) a small procumbent annual, found in sandy damp situations, such as on the banks of rivers, and in the low lands of the Flar, the war, Burma, dit on ch. phora ti

C. 2212

The Turnsole

CROZOPHORA
tinctoria.

Madras, and Burma, and is of no interest from an economic point of view, since the properties described below are alone applicable to the erect plant, and to *Chrozophora tinctoria*. The confusion alluded to by Sir Walter Elliot may be accounted for by the fact that the crumpled leaves of the procumbent plant are remarkably Borag. naceous in their

on to
dye
—“It
sules,
DYE
2213

becomes blue after exposure to the open air, they, no doubt, contain colouring matter, which might be turned to good account in the arts.” O Shaughnessy, who wrote 20 years later still, says—“The summits of the plant and the leaves are a fine source of the dye named”

species

Fibre.—The Santals prepare a strong and useful rope fibre from the bark, but it is difficult to separate (*Campbell*)

Medicine.—The ASHES of the root are given to children in coughs. The LEAVES are considered depurative, and are official under the name *nilkhanthi*. The SEEDS are used as a purgative. The Revd A Campbell states that the Santals mix the root with that of *Carissa Carandas* for blistering purposes. “This is a plant which Dr F Hamilton (MSS) had brought to him in Behar, as one of those which was supposed to have virtues in leprosy affections, the dry plant is made into decoction, to which is added a little mustard” (*Ainslie*)

Timber.—The stems of both this and the next species are regularly collected as fuel. Dr Stewart says of *C. tinctoria* “It is cut and carried into the city of Lahore to be used as fuel in ovens.” This fact may be

to are both peren-
te annuals.” The
nd to be most pro-
met with in rice

fields of Bengal, as distinct from the bushy perennial found in Chutia Nagpur and Upper India

Crozophora tinctoria, A Juss., Fl. Br. Ind., V, 408

TURNSOLE Eng

Vern.—*Shalevi*, *sonballi subali* HIND & SIND *Tappal bati*, *nilan kharanda*, Pa, *Kap-o-chust* in the Hamrud Valley, Afghanistan (Aitchison)

Habitat C—

FIBRE
2214
MEDICINE.
Ashes
2215
Leaves,
2216
Seeds,
2217
Root
2218
Dry Plant.
2219
TIMBER
Fuel,
2220

2221

CROZOPHORA
tinctoria.

The Turnsole.

DYE
Blue
2222

Yellow,
2223

Green
2224

Litmus on
Rags
2225

Powder,
2226

Sacking
Impregnated
2227

TRADE.
2228

less woolly leaves than either *C. plicata* (procumbent form) or *C. tincto-*
ria, but is covered with a granular mealy substance

Dye—Although it seems probable that most Indian authors who
allude to having observed the fruits of *Chrozophora* yielding a purplish
dye, speak of the erect perennial form of *C. plicata*, still *C. tinctoria*
doubtless affords the same dye in this country as it is cultivated for in

India of the dye principle
be of some practical utility,
industry in this dye-stuff,
opean uses and methods of
preparation The researches of Dr Joly (*Ann de Chim et de Phys*, VI,
111) have shown that the dye principle occurs in all parts of the plant and
not in
of the
cles,
blue

to from 50° to 60°, that liquid assumes a rather deep violet blue coloura-
tion, and deposits, on being evaporated, a beautiful azure-blue resinous

without the aid of mordants, a violet-red upon wool, silk, and cotton
tissues, and that this colour may be rendered fast by steaming and the
simultaneous
more blue"
called Turnes
383). "This dye is
se plants—little herbs
they yield about
times purple by
It is chiefly

exported to Holland, and is prepared for exportation by soaking coarse
linen rags or sacking with it, the rags being previously washed clean
After soaking they are allowed to dry, and are exposed to the influence
of ammonia by being suspended over heaps of stable manure They are
then packed in sacks and are ready for shipping to Holland" (*Treasury
of Botany*). "The red colour of the outer crusts of some kinds of Dutch
cheese is due to the presence of some lactic and butyric acids in that
substance No good substitute for this 'litmus on rags' for the last
named purpose has as yet ever been found A sum of £10,000 is annu-
tants of Grand Gillar-
would take to be any
ing after having been
en used to rub cheese
t the old rags take up
dily than new ones"

(Crookes)
reason to suspect that a very extensive trade might be done in it the
plant is wild everywhere on the waste lands of India, luxuriating on
both dry sandy tracts and river margins, it might be grown at a small
cost anywhere, and the subject thus seems well worthy of attention, as
there are many purposes to which it might be put in India The writer

The Crustacea—Prawns, Shrimps, Crayfish, &c.

CRYPTERONIA
pubescens.

can discover no evidence of its ever having been utilised by the natives of India but it is a remarkable coincidence that in Bengal, at least, it bears a name (*okra*) now given to several introduced American plants

Dr
3ix
t be
the
ogue

TURNSOLE-
DYE.

2229

grown as hedges around their mango trees, thus affording a possible extra revenue, while serving a purpose for which they are eminently suited, since no herbivorous animal has as yet been observed to browse either on *Jatropha glandulifera* or *Chrozophora tinctoria*.

CRUSTACEA.

2231

FOOD
Crabs

2232

Prawn

2233

Lobsters,

2234

Cray fish,

2235

Shrimps

2236

2237

MEDICINE,
2238

animal food "

CRYPTERONIA, Bl., Gen Pl., I., 782

2239

[*Man Timb* 199, LYTHRACEÆ
Crypteronia pubescens, Blume, Fl Br Ind, II., 574, Gamble,

2240

Vern — *Anando*, BURM

Habitat — A tree 20 feet high in the forest

TIMBER.
2241

for fuel.

C. 2241

Caoutchouc-producing trees.

CRYPTOSTEGIA
grandiflora.

Structure of the Wood—White, soft, with a brown, often almost black, heart-wood; very uniform, with narrow bands of darker and firmer tissue at the edge of each annual ring.

TIMBER.
2252CRYPTOSTEGIA, *R. Br.*; *Gen. Pl.*, II, 742

[ASCLEPIADACEÆ

Cryptostegia grandiflora, *R. Br.*; *Fl. Br. Ind.*, Vol. IV., 6;

2253

Vern—*Vilarjuti valundi*, MAR (according to Dr. Sakham Arjun in a letter to the author), *Palay*, MAL (according to Sir George Birdwood).

Habitat—An extensive climber, cultivated in various parts of India, supposed to be a native of Africa or Madagascar.

Caoutchouc.—Dalzell and Gibson (*Bomb. Fl. Sp.*, 55) say "the whole h is like India-rubber, ng made to extend the lombay (*See Agri-Hort. Hyderabad, Sind, 1882*, A sample of the Sind s grown in the Botanic

CAOUTCH-
OUC
2254

much blackened by oxidation; a very small portion only had retained the light colour of Ceara rubber. The whole had become agglomerated by the adhesiveness of the little separate masses of which the sample was composed

"The sample was carefully torn to pieces and examined, a separate examination being made of the lighter and darker portions. The only difference found is in the much larger quantity of moisture met with in the lighter portions

"It might have been possible to have given some assurance on this point if the time was stated how long this sample had been collected. In its present condition it is hardly equal to Ceara rubber from Brazil, although

con-
sistently

... the lighter portions lost 15.0 per cent, the darker portions lost only 2.9 per cent. The amount of ash obtained from the lighter portions was before washing 4.3 per cent, after washing 2.7 per cent. The darker portions yielded before washing 4.2 per cent, after

2255

vulcanized, as compared with the darker portions, but in this respect no difference could be perceived"

The Conservator of Forests, Northern Circle, Bombay Presidency, wrote on the 16th January 1885, that *Cryptostegia grandiflora* "is cultivated in gardens in nearly every station in India, and can be easily propagated. The cost of collecting the sap would be so great that a plantation is not

2256

The Sweet Melon.

CUCUMIS
Melo.

with the production of fertile seeds, the plants so experimented with may be viewed as varieties or even only cultivated races derived from a com-

HISTORY.

2261

fertile individuals, as we see, for example, in the human species, they must

monly stated that a fertile mule exists between the two species of Camel—*Camelus dromedarius* and *C. bactrianus*—but the progeny is more unmanageable than the mule itself, and is accordingly very little bred (see article on Camel, C 203). But Naudin's physiological classification

2262

India.

[*Mono Phanerog*, III, 462; *CUCURBITACEÆ*.Cucumis Melo, Linn, *Fl Br Ind*, II, 620, Cogniaux, in DC.,

2263

The SWEET MELON (Stewart and also Baden Powell call this the Musk Melon, but by giving it at the same time the name *Kharbuza* they remove the suspicion of *Cucurbita moschata*. The information furnished by these authors under "*C. Melo*, L.—musk melon" has accordingly been compiled under this species)

Vern — *Kharbujā* or *kharbuja* *khurbuj* or *kharbuzā*, HIND, *Kharminj*,
BENG, *Tarbuṣ*, SANTAL, *Dungwa*, C P, *Kharbuzā*, KANGRA (in Sett
Rept, 25), *Aharabujā*, *khurbuj*, *chibuda*, BOMB, *Chibunda*, MAR,

seems probable that in Bombay *Tarbuja* and *kharbuja* are applied to distinct forms of the melon

References.—Roxb, *Fl Ind*, *Fd C B C*, 701, Voigt, *Hort Sub Cal*,
58, *Thautes*, in *Ceylon Pl*, 127, Dals & Gdb, *Bomb Fl* 103, Supp,
36, Stewart, *Pb Pl*, 96; Aitchison, *Cal Pb* and *Sind Pl*, 13; DC,
Orig Cult Fl, 258, Naudin, *Ann des Scien Natur*, 4th Series,

CUCUMIS
Melo.

The Sweet Melon.

Trop Agri, 423.

Habitat.—Extensively cultivated on account of its fruit in the sandy basins of rivers. Said to be a native of North-West India, Baluchistan, and west tropical Africa (*DC.*). Ainslie wrote in 1826 that *C. Melo* "has been said to be a native of Calmuc Tartary, an opinion adopted by Willdenow; in India it is cultivated by seed brought from Persia (see *Tavernier*).

is called *ki*

Hindustan

malam pu

which pre,

methods of cultivation see under a further paragraph. A good plate of this plant occurs in Outhie and F

OIL
2264

Oil.—The flattened and ellip fact, the seeds of most of the melon and gourd family, contain oil, but

any considerable extent are those of the Sweet-melon (*Cucumis Melo*) and the Water-melon (*Citrullus vulgaris*). From West Africa large quantities of melon seeds are exported to France. China also does a considerable trade in them, but in India the fruit is chiefly eaten as such, and not allowed to ripen its seeds, and accordingly the supply of melon oil is not extensive.

MEDICINE
Seeds,
2265

Medicine.—The seeds are used as a cooling medicine. They are

Mixed seeds,
2266Pulp,
2267

diuretic, very beneficial in chronic, and also in acute eczema. It is

FOOD
2268

forcing beds. This is the practice in growing melons in the delta rivers such as the Ganges and Jumna, which consist wholly of white sand. Where the river deposit is of richer quality and contains a mixture of organic matter, a much less amount of manure is required, and it is

C. 2268

The Sweet Melon.

CUCUMIS
Melo.

FOOD

reported that occasionally manure is altogether dispensed with. The melon beds commence fruiting in April and continue yielding until they are

tradition are stated to be rather watery, but Moorcroft declares the people fatten on them 'as horses are said to do in Bokhara'. Vigne states that the melons of Tibet here he saw grow to 100 lbs. each.

2269

it), several varieties of melon are extensively grown, and Davies' Trade Report states that 300 mule-loads are annually imported thence via Badkash. The melons which, It has generate melon rich the

In Manipur the melon is cultivated by the Nagas and is of a spherical form with ten segments. The pulp of the fruit is usually sweetish and pleasant, and is eaten by Europeans as well as natives.

Cultivation.—Firminger refers to two good forms of melons, one of which—the Afghan—has been alluded to above. He says "the kind which ranks as finest of all, called the *surdah*, is a native of Cabul, and has not that I am aware, been cultivated with success in any part of India." "The seeds of this kind are at once to be distinguished from those of any other, being fully four times larger." "The next kind, second perhaps only to the *surdah*, and superior to any other with which I am acquainted, is, I believe, also from Cabul. Like the *surdah*, too, it is of the green flesh sort. It is of a large oval form, with very smooth, pale green exterior, traced here and there with a delicate network. This succeeded most satisfactorily at Ferozepore, and was the one which I cultivated exclusively. The seeds of this also may be known by the largeness of their size." Quoting from the Agri-Horticultural Society's Journal Mr Firminger gives an account of a melon sent from Buxar by a Mr W H Bartlett, who writes "with culture in a manured soil, the smaller of these melons may be made to have a sub-time

CULTIVA-
TION
2270

2271

CUCUMIS
Melo.

Indian Forms of the Melon.

CULTIVA-
TION.

system by which the Cabul melon might be grown It was, however, troublesome and expensive though attended with success. The chief features of this system were the selection of an open situation even by

a great point being the steeping of the seeds in warm water for 24 hours; afterwards retaining them in wet ashes or a wet cloth until they sprout; as soon as sprouted to be sown about a foot apart and an inch and half deep; lastly, to be deluged with water every day from sowing until the

2272

beetle. The usual preventatives adopted by the native gardeners is to dust the plants with wood ashes. This must, however, be highly injurious, and since in most cases with age the plants cease to be attacked by the beetle a better course is to cover the seedling plants with a muslin frame. The following two forms are the cucumber-like plants which, by modern European botanists, are treated as melons, and are not even allowed the position of varieties from the type.

2273

(1) Cucumis Melo, Linn : var. Momordica.

This form does not appear to be referred to in the Flora of British

spherical-ovoid) but it is frequently mottled. As Roxburgh says, the plant is more like the cucumber than the melon, except that it is less scabrous and larger. Atkinson remarks: "C. Momordica, Roxb, the plant

2274

ously when ripe; it is then from a foot to 2 feet long and from 3 to 6 inches in diameter, and weighs 4 to 8 lb. The seeds are smaller than

C. 2274

Indian Forms of the Melon.	CUCUMIS Melo.
<p>those of the common melon. A good drawing is given of the plant by Duthie and Fuller in <i>Field and Garden Crops</i></p> <p>Vern.—<i>Phut</i> or <i>phunt</i> (ripe), <i>kochra</i> (when unripe), <i>tuti</i>, HIND ; <i>Phuti</i>, BENG , <i>Kakari-kai</i>, TAM , <i>Pedda kai</i>, <i>pedda-dosai</i>, TEL , Dr U. C. Dutt says this is the <i>Eriaru</i> of Sanskrit writers Kurz in his Report on Pegu gives <i>Tha khwahumzay</i> as the Burmese</p> <p>Habitat.—Cultivated here and there throughout India : Roxburgh remarks that in the Carnatic it is a cold season crop. According to</p>	
<p>Medicine.—The seeds are used as a cooling medicine.</p> <p>Food.—Roxburgh writes,—“The fruit is much eaten both by Natives</p> <p>very wholesome.</p>	<p>OIL 2275 MEDICINE, 2276 FOOD, 2277</p>
<p>2) <i>Cucumis Melo</i>, Linn. ; var. <i>utilissima</i>.</p> <p>Syn.—<i>C. UTILISSIMUS</i>, Roxb.</p> <p>Vern.—<i>Kakri</i>, <i>kakri</i>, HIND ; <i>Kakur</i>, or <i>kankur</i> (<i>Kakri</i>, according to</p> <p><i>Takka</i>, BURM.</p> <p>Re</p>	<p>2278</p>
<p>Description.—The various writers who have described the Indian melons, cucumbers, &c, give somewhat conflicting accounts of this fruit.</p>	<p>DESCRIPTION 2279</p>
<p>some varieties of cucumber. white, usually changing to a</p> <p>C. 2281</p>	<p>Seeds. 2280 Fruits. 2281</p>

CUCUMIS
sativus

The Melon; The Cucumber

and Fuller) In the Gazetteer of the Khandesh District, Bombay, it is stated that this is the most popular and valuable of the melons

cultivated throughout the district, but that he has seen it in the

CULTIVA-
TION
2283

land out in beds, and three or four seeds sown in patches 3 feet apart

Water should be given once in 10 days (Ind in Forester, LA, 161)

Oil — The seeds yield an oil. Roxburgh describes it as a mild oil

OIL
2283
MEDICINE
2284

during the hot weather months. Roxburgh gives the following account of the fruit — 'This appears to me to be by far the most useful species of

FOOD,
2285

of it with vinegar which is very like the cucumber, but has not so much

2286

of it with vinegar which is very like the cucumber, but has not so much

2287

Cucumis sativus, Linn; Fl Br Ind., II, 620.

THE CUCUMBER

The larger form of this fruit, but for the up-ward structures on the young side, often closely resembles *C. Melo*, var. *Momordica*, and also var.

The Cucumber.

CUCUMIS
sativus.

utilissima, more nearly in fact than they approach the melon. Hence a certain confusion in the vernacular names

Syn — C HARDWICKII, *Royle, III, 147*

Vern — *Khira* HIND, *Aaknai*, ORISSA, *Sasa*, *khira*, BENG *Khira*, *Ahiyar*, PB, *Aokri* SIMLA, *Kakri*, *kankri* BOMB, *Kakdi*, MAR, *Aakari* GUZ, *Muhetechri*, TAM, *Dosa kina* TEL, *Sante kayi*, KAN, *Trapusha* (according to Dutt), *Sukasa* (according to Piddington),

Dispens, 32, *S Arjun*, *Bomb Drugs* 58 *Hunter*, *Orissa*, II, 188, *Firminger Man Gard Ind*, 126 *Baden Poxell*, *Pb Pr*, 347 *Duthie & Fuller Field and Garden Crops*, 53, *Li bo*, *U Pl Bomb*, 159, *Bird wood*, *Bomb Pr* 233 *Plates* 51 & 2

2283

antiquity of the species in Europe. There is even an Esthonian name, *Uggurits ukkurits, urits*. It does not seem to be Finnish, but to belong to the same Aryan root as *aggouria*. If the cucumber came into Europe before the Aryans, there would perhaps be some name peculiar to the Basque language, or seeds would have been found in the lake dwellings of Switzerland and Savoy, but this is not the case. The peoples in the neighbourhood of the Caucasus have names quite different to the Greek; in Tartar *Asar*, in Kalmuck *chaja*, in Armenian *karan*. The name *chisar* exists also in Arabic for a variety of the cucumber. This is, there is,

USE OF CUCUMBER IN UTILISSIMA

"In sunstroke pieces of cucumber are put on the bed so that the patient may breathe the moistened air in order to neutralize the heat of the sun."
(A Surgeon)

UCUMIS
sativus.

The Cucumber.

FOOD.

The rainy season varieties are the most common, and are universally eaten by natives of all classes as well as by Europeans. The other varieties are of smaller growth and are not so common.

A. B. 1117.

The rainy season varieties are the most common, and are universally eaten by natives of all classes as well as by Europeans. The other varieties are of smaller growth and are not so common.

2292

and if so the further suggestion might be offered that it may after all prove but a peculiar form of *Cucumis sativus*. Most if not all the forms of *C. sativus* are of the same nature, but the difference between the

might be tried in addition to the preparation of carefully dried specimens both of the natural and hybridised plants.

CULTIVA-
TION
2293

Cultivation—These plants are alluded to by many writers, but it is scarcely necessary to repeat all their statements. The following abstract from the *Indian Forester* (written by Mr. Gollan, Superintendent, Botanic Gardens, Saharanpur) gives some particulars regarding the cultivation of hot season cucumbers or gherkins:—

"This is a variety of the common cucumber, with small egg-shaped fruits, which are of a greenish-yellow colour, and are very tender.

should be sown along both sides of the drill, and if the soil be dry, water should be given immediately after sowing. After germination, water every ten days, but like the *kakri* this vegetable should not be watered too often." (*Vol. IX, 162*)

Regarding the rainy season forms Mr. Gollan (*Ind. For.*, IX, 201) says they have much larger fruits and are more like the English cucumber; there are two forms,—when in a young state the colour of one is a dark green, and of the other creamy-white; when full grown, both are about a foot long, and the colour changes to a rusty brown. These two, although not equal to the commonest varieties met with in England, are not to be despised. They thrive with little care and are always sure of yielding a crop.

2294

Firminger, in his article on Cucumber, deals fully with the two forms of the rainy season plant, but was apparently ignorant of the hot season one or did not view it as a cucumber. Speaking of the rainy season forms, he observes of the bitter sort that it "is of smaller growth and of a creamy-white colour when young, turning to a rusty colour at the end as it ripens. This answers nearly to the description of the one called the 'White Turkey.' It is the better of the two for stewing, cooked in which

The Cucumber.

CUCUMIS
trigonus.

way it affords a very delicious dish during the rains, when so few other

CULTIVA-
TION.

down in October it may be made to yield. This is a point of some interest, since, if derived from the Indian wild stock, cultivation in Europe has completely changed the character of the plant. A writer in the Agri-Horticultural Society's Journal (IV, 21) says, however, that in importing seed of cucumbers, only those grown in the open air should be got, frame cucumbers are useless for India. He recommends that they

2295

DOMESTIC,
2296

on *Shravan shudh 5th* (*Nagpanchmi* day). It is likewise employed in the worship of many other gods" (*Lisboa, U, Pl Bomb, 285*)

C Hardwickii, *Royle*, has been alluded to as most probably only the wild state of the cucumber. At the same time it bears separate vernacular names and is collected and sold for so very different purposes that it deserves an independent notice. It is known as the *air-dilu* in Kumáon

2297

Cucumis trigonus, Roxb, Fl Br, Ind, II, 619

2298

Syn — C PSEUDO COLOCYNTHIS, *Royle*, C TURBINATUS, *Roxb*, C MADER ASPATANUS, *Roxb*, C MELO, *Linn*, var AGRESTIS, *Naud*, C PUBESCENS, *Wall*, C ERIOCARPUS, *Boiss*, BRYONIA CALLOSA, *Herb Rottler*

These are the synonyms given in the *Flora of Brit. Ind.*

This may be indicated thus —

C. Melo, *Linn*

2299

Var α agrestis, *Naud*; SYN C MELO, var PUBESCENS *Kunt* (*Trans*

Var β culta, *Kunt*, SYN C DLDAM, *Linn*, C FLEXIOSUS, *Linn*; W. & A. *Prod*, 342, C AROMATICUS, *Royle*, III *Hem Bot*, pl 2, p 220

C 2299

CUCUMIS
trigonus

Wild Forms of Cucumis

C. UTILISSIMUS, Roxb., *W & A, Prod.*, 342, *C. MOMORDICA*, Roxb.,
(Conf. with synonym given under *C. MELO* & *C. SATIVUS*)

If this view be accepted a certain — — — — —
inferred as given to the possibility of (— — — — —
from some other plant than *C. trigon* — — — — —
perhaps most nearly approach — — — — —
as *C. maderaspatanus*, and I — — — — —
it is too complex for the writer — — — — —
but the opinions of the most — — — — —
that the natives of India rec — — — — —
ted by the above botanical n — — — — —
dispute the conclusions arrived at by systematic botanists, it may there-
fore serve a practical or industrial purpose to refer to some of the old
Roxburghian species and to give the various vernacular names that are
in use for them in India, and, where possible, to indicate their economic
properties. It may also be admissible in passing to suggest that the
following forms may have been the sources of *C. Momordica*, *C. utilis-*
simus, and some of the forms of *C. sativus*, but probably had little to say to
the production of *C. Melo*, provided the claims of *C. maderaspatanus*,
Roxb., be excluded from consideration, as the wild state of *C. Melo*, proper.

2300

2301

1 *Cucumis trigonus*, RoxbVern — *Pam budinga* (Roxburgh) and *Pulcho* (Elliot), TEL

2302

Botanic Diagnosis — This, as Roxburgh says, resembles most nearly *C. utilis-*
simus. It is never cultivated, nor is it eaten. The fruit is oval, smooth, distinctly
three-angled, with the angles round and the surface streaked, with ten light and ten deep
shades of yellow.

Habitat — The mountain tracts of Coromandel, Central Bengal, Central Prov
inces, and the Panjab. Flowering time the wet and cold seasons.

OIL

2303

Oil — Dr Almslie remarks that the seeds yield a fixed oil by boiling, which is
used for lamps by the poorer classes. Lieutenant Hawkes reports that it is used
for burning in lamps in some parts where the fruit abounds.

"It is extracted by boiling in water, and is procurable only in small quantities"
(Cooke). It has been found impossible to discover to which of the plants here discussed
under *C. trigonus* these notes regarding an oil obtained from the seeds of a wild
Cucumis more especially refer.

§ 'First rate oil made with the fruit for asthma' (*V. Ummejadien, Mettapol*
lian, Madras)

2304

2 *C. turbinatus*, Roxb.Vern — *Nulla budinga* (Roxburgh) and *nalla budama* (Elliot), TEL.

2305

Botanic Diagnosis — It is very much like *C. trigonus*, but the leaves are
me a
fruit,

2306

3 *C. maderaspatanus*, RoxbSyn — *C. FURSCENS*, Wall

Vern — *Ban gumak gomuk*, BERO, *Takmak*, BOMB, *Chiber*, SIND,
Kachri (Stewart), *Kakri* (Baden Powell), but *Kakri* is also *C. utilis-*
simus in the Panjab. *Kodi bu-dinga* (*Kodi budama*, according to
Elliot who calls it also Fowl's Cucumber) TEL, *Gong kakri*, SING;
Gardkshi vrisham (Elliot), *Gadumba* (Dutt), SANS

2307

Botanic Diagnosis — This is almost intermediate in type between *C. Momor-*
dica and some of the forms of *C. sativus*. The leaves are less deeply lobed than are

C. 2307

The Squash Gourd

CUCURBITA
maxima.

Botanic Diagnosis.—Leaves, 5 palmate, lobes rounded, sinus, narrow; petiole, nearly as long as the blade, not prickly; fruiting peduncle, round smooth, corolla lobes, curved outwards, calyx segments, lanceolate-linear. 2317

Habitat.—C 2318
of the globe.

as the muskmelon
find either C
the other hand a writer in the *Indian Forester* (IX., 202), and apparently, 2319
Mr. Gollan of Saharanpur, says—"Kudu (pumpkin) *Cucurbita maxima*" is

chata), and Voigt, who wrote after Roxburgh, describes only *C. maxima*, to which he reduces Roxburgh's *C. Melopepo*. Stewart gives an account of all three plants collectively under *C. maxima*.

Oil.—The seed yields an oil.

Medicine.—The seeds are used medicinally; the oil as a nervine tonic. The pulp of the fruit is often used as a poultice

§ "Also called in Panjáb *Ghā kaddu*. The fruit cut into small circular chips is a good application to relieve the burning of hands and feet in fevers" (*Asst. Surgeon Bhagwan Dass (and), Surgeon, Rawal Pindi, Panjáb*). "The pulp is used as a poultice to boils and carbuncles"

OIL.
2320
MEDICINE.
2321

Very apperitivet C. 2320—2321

Food.—This plant produces the largest known cucurbitaceous fruit, in some cases weighing as much as 240lb, and measuring nearly 8 feet in circumference. The fruit is wholesome, and when young is used as a vegetable. It is sweetish and yellow. When mature it will keep for many months if hung up in an airy place. It is largely used by natives of all classes in curry. "When very young and tender it may be employed as a pleasant vegetable for the European table, by being boiled, press-

FOOD.
2322

C. 2322

CUCURBITA
moschata.

The Musk Melon.

ed down to extract the water, and served warm, with butter, salt, and pepper" (Mr L. Liotard).

Mr Gollan says of "*kudu* (pumpkin) *Cucurbita maxima*" that there are several varieties of this plant common in the gardens as a rainy season vegetable. The commonest one is a large globular gourd and of a brown colour. The young fruit resembles the vegetable marrow in flavour but the full grown fruit is also very good. The seeds should be sown from April to June. The plant requires very rich soil and the general treatment is the same as that for *Lagenaria vulgaris* (the *Al kudu*).

2323

Firminger remarks of the "Red Gourd" or *sufuri-kumra*, also *Lal-*

carrots are, it can hardly be distinguished from them either in appearance or flavour. An annual seed sown in the rains; vegetable in use during the cold season, not often cultivated in gardens. It may be suspected that Firminger alludes in the above to *C. moschata* (forma

2324

mon Gourd
dian writers
vulgaris the
"Cucurbita
of the same
kind, while

2325

Cucurbita moschata, *Duchesne, Fl. Br Ind, II, 622.*

THE MUSK MELON, *Eng*, POTIRON, *Fr.*

Syn — *C. Melopepo*, *Roxb*

Vern — *Sitaphal, saphari kumhra, kumra, kadda, mitha kadda*, N-W P.; *Kali-dudhi*, *Bomb*

This is said to be the *Abobrade Guinea* of the Portuguese in India.

2326

Botanic Diagnosis — Leaves as in the preceding but very often marbled with whitish blotches. Petiole hairy but not prickly. Fruiting peduncles angular and furrowed. Calyx segments of the female flower large foliaceous.

There are two primary forms — one with the fruit smooth but mottled brown and yellow (*C. moschata* proper), and the other with the fruit torulose or fluted, with 15 to 30 ridges (*C. Melopepo*, *Roxb*).

Habitat — Very extensively cu

2327

The long account given by Firminger (*Van Gar for India, 128*) under the heading "*C. Melopepo*, squash" has reference to imported seed of Squash, Gourd or *C. moschata*.

North-West
not live in the
(in Field and
of *Cucurbita*
cultivation,

The Pumpkin or Vegetable Marrow.

CUCURBITA
Pepo.

season, &c. They state that only the *Cucurbita* there figured appears to occur in the North-West Provinces. Their plates seem to represent the form Roxburgh called *C. Meloepo* and not his *C. moschata* proper, if the idea be correct that the fluted fruit is *C. Meloepo*.

Oil
2328
Food
2329

2330

C. Melopepo which would have answered to Mr. Powell's description of *tindé*.

233I

Cucurbita Pepo, DC., Fl Br. Ind., II., 622.

THE PUMPHIN, VEGETABLE MARROW.

Syn.—C *Ретро. Ротб*

Roxburgh included this plant (the pumpkin) as well as *Benincasa*
cerifera, *Savi* (the white melon) under one species. Atkinson, Drury,

mouth, and the anthers are more or less united. The fruits of Benin-

does

Botanic Diagnosis.—Leaves 5-palmate, sinus, broad and segment pointed, petiole as long as the blade, the hairs of the lower surface

OIL
2332
MEDICINE.
2333

nal applications for burns.

2 T

C. 2333

CUMINUM
Cuminum,

The Pumpkin or Vegetable Marrow.

MEDICINE.

Special Opinions — § "The seeds are anthelmintic and used in cases for round worms though uncertain in action" (*Civil Surgeon F. H. Thornton, B A, M B, Monghyr*) "Grubler has isolated from pumpkin seeds a crystallisable variety of albumen. Hemp and castor oil seeds also contain a similar crystallisable substance" (*Dr. F. H. Thornton, C. I. Ind.*)

FOOD
2334Rolled
2335Twigs
2336Sherbet.
2337DOMESTIC
2338

seen the pumpkin (C. Pepo) in Assam, although the two fruits named are common in Assam, Cachir, and Manipur. The system of boiling in *klar* water is, however, very interesting to whichever fruit it applies and so also is the fact that the young twigs are eaten as a pot-herb. Under the names "C. Pepo, DC, pumpkin or white Gourd—*kumhra, kumara, kadimih peth* (in places), *kondur* the *lauka* and *kaddu safet* of Bijnor," Mr Baden Powell, and after him Mr Atkinson record an interesting fact which most probably should be given under *Benincasa cerifera*. "A sherbet is made by filling the hollow centre with sugar and exposing it to the sun until it becomes acid."

Domestic and Sacred Uses — "The seeds are recommended for the cure of this plant considering it and *Narad* priest of the gods tell of this cucurbitaceous plant (*vide page 310 of Vaidya in Sanskrit*) from *Pilani Puran*) Its fruit is also cut with some ceremony, called *kohala muhurt*, a day or two before a marriage" (*Lisboa, U Pl Bomb, 185*)

CUMINUM, Linn, Gen Pl, I, 926

2339 Cuminum Cuminum, Linn, Fl Br Ind, II, 718; UNDELLIFERE.

CUMIN, Eng, the *κuminum* of DIOSCORIDES, CUMINUM of HORACE and PERSIUS

Vern — *Zard*, HIND; *Jiraka, jiraka* or *ajdi* (Ainslie) "*Jiraka, jirana*" (Elliot), SANS, *Jira*, BENG, *Jira*, *Jira ulnis*, GR, *Jire*, *Jire*, MAR, *Kaman*, ARAB, *Zira*, PERS, *Zero*, SIND, *Shiragan*, TAN, *Jiraka*, "*jilakurra*" (Elliot), TEL, *Jirange, jirage*, KAN, *Jirakam*, MAL, *Duru, sudu duru*, SING, *Ziya*, BURM

A considerable amount of confusion exists in the vernacular names for this plant, *Zira* or *Jira* being also applied to *Carum Carui* (See C 681).

The Black Cumin of the Bible—*Melanthion* of Hippocrates and Dioscorides, and the *Gill* of Pliny is *Nigella sativa*

Habitat — More or less cultivated in most provinces of India except perhaps Bengal and Assam. There seems no doubt the plant is not a native of India. Roxburgh is silent on this point, but Ainslie, who wrote

The Cumin

CUMINUM
Cuminum.

about the same period says of the Calcutta Botanic Gardens (which were then under Dr Roxburgh) that "the plant, however, is growing in the Bo

2340

and *and*, the quantity seems enormous. The same authority also gives 25
 maunds as exported by that route. Atkinson makes no mention of
 his Cata-
 in Fe-
 North-
 he plant

References — *Roxb, Fl Ind, Ed C B C, 771, Vahl, Hort Sub Cal,*

Oil — A medicinal oil is prepared from the seeds (=fruits)

Medicine. — As a medicine Cumin seeds are considered aromatic, car-
 minative, and stimulant. They are also stomachic and astringent, and
 useful in dyspepsia and diarrhoea. The *Pharmacopæia of India* says

OIL.
 2341
 MEDICINE
 2342

CUMINUM
Cuminum.

The Cumin

MEDICINE

or Persian, Nabti or Nabathian, Kirmans or black Cumin, which they say is the Basilikon of the Greeks and Shind of Syrian. They consider it to have the same properties as the cumin. (Dymock) Duff says that "made of cumin seeds with the" to be applied externally for

"ive and stomachic, half drachm doses, in combination, never alone (Assistant Surgeon Nehal Sing, Saharunpore) "Seeds mixed with lime juice are used in bilious nausea in pregnant females" (Surgeon-Major J. J. L. Ratton, M.D., M.C., Salem) "Sindura is taken internally shortly after child-birth to increase the secretion of milk" (Civil Surgeon R. Gray, Lalore). "A quantity of the seeds lightly smeared with ghi put into a pipe and smoked relieves hiccup" (Surgeon-Major D. R. Thomson, M.D., C.I.E., Madras) "A reputed galactagogue" "Practitioner" (Nov. 1891, Vol. XXVII, p. 385, and p. 161 (quoting *Lancet*, 1872) however denies this action" (G. B.)

CHEMISTRY.

2343

Chemistry.—The chemistry of cumin has been dealt with fully by Flückiger and Hanbury (*Pharmazie*, 332), and their account reproduced in Dymock's *Materia Medica* (2nd Ed., 369). It is not necessary therefore to repeat the information there given, since either of the works referred to is likely to be in the hands of the student of Indian Materia Medica. Professor Warden has, however, contributed the following brief note for the present publication:—

"The fruit contains an essential oil, which is a mixture of Cymol and Cumimol, and other hydrocarbons. Cymol is also a product of the dry distillation of coal tar."

FOOD.

2344

the natives

TRADE

2345

Trade.—Cumin (or Cummin) would appear to have been known to the ancients, at least there are names for it in most of the classical languages. During the middle ages it was one of the most favoured of spices. In one instance it is recorded that during 716 A.D. an annual provision was of most was in 1453 don had frequent use, was one of the the weighing and oversight

Foreign

Trade.

2346

At the present day the European demand has greatly declined, the export of Cumin from Bombay 20,040 cwt. from Calcutta in the year 1870-71 quotations, since only about one-fourth of those amounts left India, the remainder represented the coasting traffic, and hence a further error, since some of the coasting imports into each of the ports named would have

2347

C. 2347

The Weeping Cypress.

CUPRESSUS
funnebris

reappeared again in the foreign exports therefrom. Thus of the exports from Calcutta 14,037½ cwt went to other Indian ports, nearly 2,000 cwt going to Bombay, an amount which must have greatly influenced the Bombay exports of the year. These remarks have been considered necessary owing to its being customary to find India assigned a far larger share in the world's trade in Cumin than is justified by the official returns. An analysis of the figures for the year 1875-76, compared with those for 1886-87, will remove this misconception. Last year the total exports were — Indian grown Cumin 9,051 cwt + foreign imports re-exported 1,260 cwt, or a total of 10,311 cwt. This amount was valued at Rs. 41,436. In 1875-76 the total exports were 8,120 cwt, valued at Rs. 4,919. The foreign trade in Cumin has thus slightly improved, but it falls far short of what most readers would infer from the amounts quoted above as exported from two of the Indian ports. Of the foreign imports, India received in 1875-76 only 538 cwt, and last year 2,020 cwt, so that deducting the re-exports, 760 cwt was thus added to the amount locally produced in 1886-87. But of the foreign imports 1,994 cwt came from Persia and the remainder from Turkey in Asia.

TRADE.
Foreign
Trade.

2348

to Sind
Bombay
cwt C
and Ea

cwt, and the United Kingdom only 95 cwt

The Indian internal trade in Cumin must be at least four times as extensive as the foreign, but the ramifications of road, rail, river, and coast-

Internal
Trade.
2349

Indian market

Dr Dymock says of the Bombay traffic in Cumin that it "comes from Jubbulpore, Guzerat, Rutlam, and Muscat. Value, Rutlam, Rs 8 to Rs 9 per Surat maund of 37½ lb, Muscat Rs 6 to Rs 6½, Guzerat, Rs 3 to Rs 7½, Jubbulpore, Rs 3 to Rs 6."

2350

Domestic and other Uses — By the ancients smoking Cumin seeds was considered to produce pallor of the countenance

DOMESTIC.
2351

Cuprea Bark, the bark of *Ramija purdicana* or *R. pedunculata*, see Cinchona, C 1152

CUPRESSUS, Linn, Gen Pl, III, 427

[Timb, 410, CONIFERÆ

Cupressus funnebris, Endl, Brandis, For Fl, 534, Gamble, Man,

2352

THE WEEPING CYPRESS

Vern. — Chandang, Ichenden, BRUTIA

Habitat — A handsome tree with pendulous branches, and a fibrous brown bark, often planted in Nepal, Sikkim, and Bhutan, near temples and monasteries, and in China (Gamble)

C. 2352

CUPRUM	Copper.
DISTRIBUTION	
	<p>and also in several of the groups of transition rocks, as, for example, in the Cuddapah, Bijawar, and Arvali groups. In extra peninsular India they are found for the most part in highly metamorphosed rocks, the precise age relations of which to those of the peninsula are not in all cases clearly made out as yet.</p> <p>2364 "The ore of most common occurrence is the copper or pyrites but towards the outcrops it is commonly altered into carbonates or oxides. The associated minerals are in general identical with those which are found under similar circumstances all the world over. Recent analyses by Mr. Mallet have tended to clear up much of the uncertainty which</p> <p>tions, the copper ores of the Himalayas are either sparsely disseminated or in sive bunches and nests in cracks and fissures traversed filled with ore which thus resembles true lodes. In not a few cases it is be-</p> <p>flows through tertiary metal, reaching up stream, and were error of Ladakh, as Geological Museum (weighing about 21 oz.) cut from a lump of some</p>
FOREIGN TRADE 2365	<p>old copper, unwrought and wrought copper, amounted to 615,049 cwts., valued at Rs. 99,40,085. For the past 20 or 30 years the imports of copper have steadily increased with the increased agricultural prosperity of the people, but within that period they have borne a marked relation to the fluctuations of agriculture. In the year 1885-86 the review copper nuary</p>

Copper Sulphate.

CUPRI Sulphas.

FOREIGN TRADE

as a ton, in January 1884, at £57-5s, of this year it had further fallen to be much lower, falling below £45 than it has ever been, being more price ever known, and authorities state 30 per cent below what the trade had previously considered a safe and moderate price. This decline is due to a greatly increased production in the United States, and it would seem to those who are in a position to estimate the conditions of future production there and else-
in Calcutta, and it has 50 per cent three-fourths every year is trade is,

2366

however, more apparent than real, as a large proportion of it is due to the fact that it comes direct to India instead of to England. This direct shipment is of great value, as it means that the commercial relations of India with Australia are becoming more intimate.

Cupri Sulphas.

2367

COPPER SULPHATE OR BLUE STONE

Vern — *Nila thutha*, *nila tuta*, *nilla tuti*, *a*, *Hind*, *Môr tuttā* or *mādr*.

References — *Pharm Ind.*, 378; *Moodeen Sheriff's Supp to Pharm Ind.*, 123, *U C Dutt, Mat Med Hind*, 66, *Waring's Basar Med*, 46

MEDICINE,
Salts
2368

vaprakṣa says it contains some copper and therefore possesses some of the properties of that metal. It is described in this work as astringent,

2369

2370

porating to crysallization

2371

According to European Medical practice pure sulphate of copper is tonic, astringent, emetic; in large doses an irritant poison. Locally applied in substance to a denuded or granulating surface, mildly caustic, styptic, and in solution stimulant. The article so used is imported from Europe. It is largely used in chronic dysentery, diarrhoea, epilepsy, chorea, and hysteria. Locally, it is applied in solution in gonorrhoea, leucorrhoea, purulent ophthalmia, weak ulcers, superficial hæmorrhage,

2372

C. 2372

CURCULIGO
Orchioides.

Copper Sulphate

MEDICINE.

and, in substance, to crancrum oris, aphthous ulcerations, exuberant granulations, and granular conjunctivitis (*Pharm. Ind.*) Waring recommends an emetic of 5 grains of sulphate of copper in tepid water for Opium, Datura, Nux Vomica, Coccus Indicus, Bish (Aconite), Arsenic, or other poisoning cases. If it does not operate in half an hour it may be repeated.

Spe C
is a re
nally "
calcine
expecte

Robb, Ahmedabad) "Sulphate of copper is used internally as astringent in chronic dysentery and diarrhoea in dose of $\frac{1}{4}$ to $\frac{1}{2}$ of grain, also applied externally" (*Asstt Surgeon Nehal Sing, Saharunpore*) "Copper coins, on which there is a deposit of verdigris, are kept for an hour or two in a mixture of (ripe) tamarind and water, and then rubbed on parts of body attacked by urticaria" (*Honorary Surgeon P. Kinsley, Chicacole, Ganjam, Madras Presidency*) "Useful as an emetic in cases of poisoning" (*Civil Surgeon J. H. Thornton, B.A., M.B., Monghyr*) "Copper foil (Shabari, Swahili, E. Africa) cut into small pieces about an inch or more square, which are spread over the chest before and behind is the native (African) treatment of cough and all general chest troubles. Two dozen of these thin copper plates were counted in a case that came up for other treatment; their application is on the principle of a series of small blisters or counter-irritants" (*Zanzibar*).—*Surgeon-Major John Robb, M.D., Surat, Bombay, Presidency.*

COPPER LEAF—A thin copper foil is sold in the Muscat bazar as an external application to unhealthy ulcers. It is applied like thin Gutta-percha tissue over the surface of the ulcer and secured for days by means of a bandage.

Plates.
2373

Leaf
2374

CURCULIGO, *Gartn.*, *Gen. Pl.*, III, 717

[p. 124, AMARYLLIDÆ.

2375

Curculigo orchioides, *Gartn.*, *Baker, Linn. Soc. Jour.*, XVII,

Most authors refer the native medicinal tuber known in the Panjab as *siyah musli* to this plant, but Stewart says it is obtained from *Anilema tuberosa*, *Ham.*, and Dymock describes it under *Hypoxis orchioides*, Willd., giving *Curculigo orchioides* as a synonym. In Bengal the tuber is generally known as *Tal lura*.

Syn.—CURCULIGO MALABARICA Wight, *lc.*, t. 2043, HYPOXIS ORCHIOIDES
Ait., in *Ann. Mus. Lug. Bat.* IV, 177, ORCHIS AMBOINICA MAJOR

BOMB,
(varaki,
"TAM,
iti gadda,

i, I, 242
rm Ind,
"Tal Med,
m Ceylon,
Rherde,

Siyah Musli

CURCULIGO
orchioides.

Habitat — A small herbaceous plant with a rosette of radical leaves and tuberous root, native of the greater part of the hotter regions of India and Ceylon. Roxburgh says that in cultivation it flowers all the year round.

Medicine — In most Hindu and Muhammadan works on Materia

MEDICINE
Black root

white *Asparagus adscendens*. According to some writers the young roots of *Bombax malabaricum* constitute one of the white *muslis*, and by others the black and white forms are obtained from one and the same plant during different stages of its growth. Dr. Moodeen Sheriff remarks that in South India a false *sufed musli* is sold which is obtained from *Asparagus sarmentosus* (A 1577). On the other hand Dr. U. C. Dutt says "The roots of *Bombax malabaricum* and of *Asparagus racemosus* are sometimes sold by the native druggists of Calcutta under the name of *saffed musli*. These are clearly not the same as the *muslis*."

C. ensifolia as the *kali musli*. He further states that much of the latter root sold in the Bombay Presidency is *Ancilema scapiflorum*, Wight (Conf. A 1122). Dr. Dutt says of *C. orchioides* "The tuberous roots of

2379

and sometimes given with milk and sugar, in doses of two drachms in the twenty-four hours in cases of gonorrhoea.

says "It
gonorrhoea
disiac, &

Medical

Rutham
maund or 3 1/2 lb

TRADE
2380

Wild Arrowroot.

CURCUMA
angustifolia.

found wild in the North-West Himalaya. The flowers are large and yellow, longer than the bracts, they expand in the morning and wither in the evening of the same day.

Cultivation of East Indian Arrowroot.—Perhaps the most complete accounts of the cultivation of this plant are those which will be found in the Reports of the Sydapet Experimental Farm, Madras. The following

CULTIVA-
TION
2386

Madras Root-
stocks.
2387

the above yield would represent an outturn of 493lb of flour per acre. In another case in the College Experimental Garden, a plot, measuring 1,160 square yards, planted with this crop yielded 1,798lb, or at the rate of 7,500lb per acre. The culture of this crop is very simple: it is only necessary to plant the sets in properly prepared soil, and to water them occasionally during the dry season. The removal of the crop is tedious unless the tubers can be ploughed out, as potatoes are done in England, which is seldom possible owing to the dryness of the soil, so that the tubers have to be dug up. The preparation of the flour is also very simple and easy. The TUBERS have only to be reduced to pulp on a grater, after being well washed to remove soil and dirt, and then the pulp is mixed thoroughly with water so as to separate the starch completely from the fibrous matters. The whole is afterwards strained through cloth, through which the STARCH and water passes, and the fibre left behind. After this the STARCH has only to be thoroughly washed by decantation with clean water, and dried in the sun. It is then rolled on a table to break it up thoroughly into fine flour and is ready for sale. The flour can be produced at a very low price; it could be sold profitably at 4 annas per pound. And thus 400 rupees per acre could be realized. This is a remarkable return and should also be published for the information of the public."

Starch,
2388

Profit
Rs. 400
an acre.

"The following extract from a letter from the Collector of South Kanara, dated 10th March 1882, No. 517, will be found interesting: "With reference to paragraph 48 of your report on the Saidapet Farm, recorded with the Board's Proceedings dated 10th December 1881, No. 3182, I

South Kanara.
2389

plant in this district (with its annual rainfall of about 130 inches between June and November) would be thankfully received. The plant, I believe,

a angusti-

ration and

C.

CHEMISTRY,
2390
Inferior to
Maranta.
2391

yielded by sample marked '1st sort' is of a superior description and nearly as good as that of the Maranta. This sample is susceptible of further

C. 2391

Wild Turmeric

CURCUMA
aromatica.

for export" (For further particulars see the paragraph on Cultivation.)

PREPARATION OF

2403

Malabar.
2404

be trusted as referring to this or to the true arrowroot See *Maranta arundinacea*

Dymock remarks of Turmeric (*Curcuma longa*) that the starch "of the young tubers at the end of the radicles, which are nearly colourless, forms one of the Last Indian arrowroots. It is to be observed that the tubers that yield only starch when young will yield turmeric when old, the colouring matter and aromatic principles are deposited in the cells at a later period of growth."

Turmeric.
2405
Starch.
2406

Curcuma aromatica, Salisb., Roxb., Fl Ind, Ed C B C., 8.

WILD TURMERIC, YELLOW ZEDOARY, COCHIN TURMERIC

Syn — *CURCUMA ZEDOARIA*, Roxb

Vern — *Yangli haldi*, *ban haldi*, *ban haridra* (*jedwar*?), HIND *Ban*

halud, BENG

Kasturi man

kattu manna

Roxburgh

SING, *Aiydsanoin*, BURM

References — *Voigt*, Hort S

Ainslie, Mat Ind I, 40

125, U C Dutt, Mat Me

Ind 769, Year Book P

regarding Pharm Ind,

clap 859

Habitat — Roxburgh says of his *Curcuma Zedoaria* "This beautiful species is a native, not only of Bengal (and common in gardens about Calcutta), but is also a native of China, and various other parts of Asia and the Asiatic islands. Flowering time, the hot season, the leaves appear about the same period or rather after, for it is not uncommon to find the beautiful, large, rosy, tufted spikes rising from the naked earth before a single leaf is to be seen." "The plant when in flower is highly ornamental few surpassing it in beauty, at the same time it possesses a considerable degree of delicate aromatic fragrance."

The flowering spikes are quite distinct from the leaf bearing stems,

Bengal
2407

Malabar.
2408

Concan.
2409

observe that the leaves when young have a central purple stain which

C. 2409

CURCUMA
aromatica.

Wild Turmeric.

Mysore
2410
Travancore.

2411

HISTORY.

2412

almost disappears when they attain their full size" Drury remarks that it is abundant in the Travancore forests. Of Mysore Mr D E Hutchins says *C. aromatica*, the *Kad arassna*, is collected from the forests all over the province.

History of *Jadvar* and *Zedoary* —The reader is referred to *Aconitum heterophyllum*, (A 401 & 403), for further particulars regarding the use of the Arabic word *Jadvar*. According to certain writers (including Roxburgh) this is applied to a species of *Curcuma*, presumably the present species. To Dr Moodeen Sheriff we are indebted for the results of much careful botanical investigation.

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sian works also used as synonymous, but the former is more correctly the name for the medicinal wood obtained from a species of *Berberis*.

2413

of the Bhotias, who

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2414

2415

is used by
ahlo bikh
kh of the
'hobikh is

given as a tonic in dyspepsia, fevers, and asthma. Lastly, a plant never before recorded as used medicinally, namely, *Caragana crassicaulis*, is

2416

Wild Turmeric

CURCUMA
aromatica.

Nepal, "must not be confounded with the word *Narbisi*, which is the Sanskrit for *Curcuma Zedoaria*." To the hill tribes around Simla and Kulu, at

often more than a dozen and smaller tubers are found together. Some of the tubers are almond in shape, some are few fleshy. The tubers have a deep orange colour like turmeric, the odour of the flesh root is strongly camphoraceous." Dalzell and Gibson say: "The tubers of the root are palmate."

DESCRIP-
TION
2417

DYE
2418

Cosmetic,
2419
MEDICINE
Rhizomes
2420

to promote eruptions." Ainslie says the Muhammadans suppose it to be a valuable medicine in certain cases of snake-bites, administered in small doses, and in conjunction with golden-coloured orpiment, *kust* (*Costus arabicus*), and *ajwan*.

Special Opinions.—6 "Used externally in scabies and the eruption of small pox" (*Surgeon-Major Henry David Cook, Calcutta, Malabar*). "Rubbed into a paste with benzoin is a common domestic application to the forehead for headache" (*Surgeon-Major John North, I M S, Bangalore*). "Applied to the forehead in cephalalgia, and a cosmetic."

CURCUMA
caulina.

Black Zedoary.

TRADE.
2421

(T. Ruthnam Moodelliar, Native Surgeon, Chingleput, Madras Presidency.)

Trade.—"The Bombay market is supplied from the Malabar coast. Value, unpeeled R24 to R25 per candy of 5½ cwt; peeled R27 per candy" (Dymock).

2422

Curcuma caesia, Roxb.; *Fl. Ind., Ed. C.B.C., 9.*

BLACK ZEDOARY.

Vern—*Adla koldior nil-kantha*, BENG; *Kāli kalada*, MAR.; *Nar-kachira*, ROM.

S

Bengal.
2423
Dinapore.
2424

Habitat.—Roxburgh remarks: "This elegant strongly-marked species is a native of Bengal, where it blossoms in May" and just before the rains. "In the deep ferrug resembles *C. Zerum*." "The middle of the leaves it resembles *C. Zerum*." "The colour of the roots" Dymock says it is the Indian market. He adds "through Peters I have been supplied with living inapore; he informs me that it is common in gardens in Bengal, and is used as a domestic remedy."

MEDICINE
Rhizomes,
2425Per
mo
andCosmetic,
2426TRADE.
2427

Trade.—Dymock says the tubers are internally very hard and horny, of a greyish black, but when cut in thin slices of a greyish-orange. The odour and taste are camphoraceous. "The drug comes overland from

2428

C. caulina, Graham; *Dalz. and Gibs., Bomb. Fl., 275.*Vern—*Chavara, chowar*, BOMB.

Habitat.—A plant common at Mahābaleshvar, Bombay, and described by the late Mr. Graham.

FOOD.
Rhizomes,
2429
Arrowroot,
2430Food.—A form of ARROWROOT is said to be prepared from this plant. It is sold under the name of *Sin-Cocoma* Redwood and other names, the best being

the bazaars at Bombay. In 1878, a European prepared a few hundred pounds of it, and sent samples to be tried by Messrs. Treacher & Co., Phillips & Co., and Kemp & Co., but it was found wanting in nutritive

C. 2430

The Tikor; Turmeric.

CURCUMA
longa.

"The preparation of Arrowroot at Mahābaleshvar is simple. The root (of which a cooly will gather 4 or 5 large basketsful a day for as many annas) is scraped, washed, and rubbed to pulp on a grater, as mortars are found to crush the globules. The pulp must then be washed no less than a dozen times at least, the sediment being stirred at each washing. The dark scum on the sediment and the muddiness of the water of the first washing slowly disappear, till when the sediment is pure-white it is allowed to harden into a cake, which is afterwards reduced to powder. A basketful of roots yields 3-4 lb of pure arrowroot."

2431

Curcuma leucorrhiza, Roxb., Fl. Ind., Ed. C.B.C., 10.

Vern.—Tikor, BENG

Ti

Habitat.—Roxburgh says this is a native of Behar. Mr. J. Glass,

paration of arrowroot from this plant, "the process for obtaining the starchy substance called *Tikor* is as follows: the root is dug up, and rubbed on a stone, or beat in a mortar, and afterwards rubbed in water with the hand, and strained through a cloth, the fecula having subsided, the water is poured off, and the *Tikor* (fecula) dried for use." Dr. Irvine (*Mat. Med. Patna*) alluding to this species says its "fine amylaceous farina is equal to arrowroot."

FOOD,
Arrowroot.
2432

C. longa, Roxb., Fl. Ind., Ed. C.B.C., 11.

TURNERIC.

Vern.—Haldi, HIND; Halud, BENG; Haldar, halja, PB; Haridra,

2433

D

sabē ghin and the Persian *Zard chubak*. This is probably the *Kurkum* of Dioscorides. U. O. Dutt writes that the Sanskrit *haridradra* or the two turmeric, signifies turmeric and the wood of *Berberis asiatica*, Moodeen Sheriff says that in many books *Kurkum* is incorrectly given to saffron, and that *haridra* is also wrongly given to yellow orpiment, that substance being in Sanskrit *Haridra lakam*.

References.—1812 Hort Sub Cal., 565, Thwaites, En Ceylon Pl., 316; Dals & Gids, Bomb Pl., 67; Stewart, Pb Pl., 238, Manjella kua Rheede Hort Ind. VI. 7. Stewart, Pb Pl., 238, Manjella kua Rumph Am Gmelin and Mat Ind, Sheriff Suppl., 1812, 1813, 1814, 1815, 1816, 1817, 1818, 1819, 1820, 1821, 1822, 1823, 1824, 1825, 1826, 1827, 1828, 1829, 1830, 1831, 1832, 1833, 1834, 1835, 1836, 1837, 1838, 1839, 1840, 1841, 1842, 1843, 1844, 1845, 1846, 1847, 1848, 1849, 1850, 1851, 1852, 1853, 1854, 1855, 1856, 1857, 1858, 1859, 1860, 1861, 1862, 1863, 1864, 1865, 1866, 1867, 1868, 1869, 1870, 1871, 1872, 1873, 1874, 1875, 1876, 1877, 1878, 1879, 1880, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1889, 1890, 1891, 1892, 1893, 1894, 1895, 1896, 1897, 1898, 1899, 1900, 1901, 1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929, 1930, 1931, 1932, 1933, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 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2795, 2796, 2797, 2798, 2799, 2800, 2801, 2802, 2803, 2804, 2805, 2806, 2807, 2808, 2809, 2810, 2811, 2812, 2813, 2814, 2815, 2816, 2817, 2818, 2819, 2820, 2821, 2822, 2823, 2824, 2825, 2826, 2827, 2828, 2829, 2830, 2831, 2832, 2833, 2834, 2835, 2836, 2837, 2838, 2839, 2840, 2841, 2842, 2843, 2844, 2845, 2846, 2847, 2848, 2849, 2850, 2851, 2852, 2853, 2854, 2855, 2856, 2857, 2858, 2859, 2860, 2861, 2862, 2863, 2864, 2865, 2866, 2867, 2868, 2869, 2870, 2871, 2872, 2873, 2874, 2875, 2876, 2877, 2878, 2879, 2880, 2881, 2882, 2883, 2884, 2885, 2886, 2887, 2888, 2889, 2890, 2891, 2892, 2893, 2894, 2895, 2896, 2897, 2898, 2899, 2900, 2901, 2902, 2903, 2904, 2905, 2906, 2907, 2908, 2909, 2910, 2911, 2912, 2913, 2914, 2915, 2916, 2917, 2918, 2919, 2920, 2921, 2922, 2923, 2924, 2925, 2926, 2927, 2928, 2929, 2930, 2931, 2932, 2933, 2934, 2935, 2936, 2937, 2938, 2939, 2940, 2941, 2942, 2943, 2944, 2945, 2946, 2947, 2948, 2949, 2950, 2951, 2952, 2953, 2954, 2955, 2956, 2957, 2958, 2959, 2960, 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3293, 3294, 3295, 3296, 3297, 3298, 3299, 3300, 3301, 3302, 3303, 3304, 3305, 3306, 3307, 3308, 3309, 3310, 3311, 3312, 3313, 3314, 3315, 3316, 3317, 3318, 3319, 3320, 3321, 3322, 3323, 3324, 3325, 3326, 3327, 3328, 3329, 3330, 3331, 3332, 3333, 3334, 3335, 3336, 3337, 3338, 3339, 3340, 3341, 3342, 3343, 3344, 3345, 3346, 3347, 3348, 3349, 3350, 3351, 3352, 3353, 3354, 3355, 3356, 3357, 3358, 3359, 3360, 3361, 3362, 3363, 3364, 3365, 3366, 3367, 3368, 3369, 3370, 3371, 3372, 3373, 3374, 3375, 3376, 3377, 3378, 3379, 3380, 3381, 3382, 3383, 3384, 3385, 3386, 3387, 3388, 3389, 3390, 3391, 3392, 3393, 3394, 3395, 3396, 3397, 3398, 3399, 3400, 3401, 3402, 3403, 3404, 3405, 3406, 3407, 3408, 3409, 3410, 3411, 3412, 3413, 3414, 3415, 3416, 3417, 3418, 3419, 3420, 3421, 3422, 3423, 3424, 3425, 3426, 3427, 3428, 3429, 3430, 3431, 3432, 3433, 3434, 3435, 3436, 3437, 3438, 3439, 3440, 3441, 3442, 3443, 3444, 3445, 3446, 3447, 3448, 3449, 3450, 3451, 3452, 3453, 3454, 3455, 3456, 3457, 3458, 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CURCUMA
longa.

Turmeric

CULTIVATION

Drugs, Sind 21, Waring, Basar Med, 140; Year Book Pharm, 1873, p 113 Medical Topog, Ajmir, 135, Mason, Burma 513 863; Man Coimbatore Dist, 238, 229, and 230, Baden Powell, Pb Pr, 299 380

Condiment
Form
2434
Dye Form.
2435

Habit

rhizomes It is the well-known *haldi* universally used as a condiment with curry-stuffs and also as a dye, and is one of the most profitable of crops The dye-yielding rhizome is harder and much richer in colour than the edible These conditions are thus special adaptations which possibly point to an ancient cultivation At the same time, though several species of *Curcuma* are undoubtedly natives of India, some of which appear to have been mistaken for the true turmeric, there is little of a positive character that would justify the supposition that *Curcuma longa* itself is a native of India Simmonds (*Tropical Agriculture*, p 383) says "The *Curcuma longa* grows wild in the province of Mysore, and is probably indigenous to various other parts" On the other hand, Roxburgh and all botanical writers speak of it only as cultivated, and Ansie even remarks that "The *Curcuma longa* grows wild in Cochin-China, and is there called *Kuong huynh* Loureiro gives us a long list of its medicinal virtues in lepra, jaundice, and other disorders

it in
at it is
have
superseded some of the indigenous *Curcumas* formerly in use and which bore the names now given to this plant, just as the true arrowroot plant is rapidly displacing the indigenous or East Indian species Dalzell and

Turmeric, see page 664

CULTIVATION

2436
Bengal
2437

CULTIVATION, YIELD, AND SOIL.

Bengal.—The earliest and to this day one of the most complete accounts of the cultivation of turmeric in Bengal is given by Mr. J. H. B. This may be systems "The overflow during the

Deshl
2438

as the *deshi* or country, and the other as the Patna variety The latter is of a richer colour and gives a better outturn Loamy soil, even of a very inferior quality, will grow turmeric It can be grown in shady

C. 2438

Turmeric.

CURCUMA
longa.

held being twice as large and 27 inches apart. Sugar-cane cuttings are very lightly covered with earth; over 6 inches of earth is placed on the turmeric cuttings. The usual planting time is the first week of Jaistya, that is, about the 20th of May. "The plants spring up in about a fortnight. One or two weedings are necessary, and care must be taken that the fields are not inundated. In some parts of Bengal it is not considered good practice to lift the plants the first year. On the setting in of the following rains new shoots appear and the plants are tended exactly as in the first year. 'After about a year and nine months turmeric is lifted' When it is raised the first year, as is the practice in some places, the produce is less in quantity and inferior in quality." The Director of Agriculture, Bengal, has the following estimate of the cost of cultivation:—

	R	a.	p.
6 Ploughings	2	4	0
3 maunds of seed at Rs	9	0	0
Planting, 8 men at 4 annas a day	2	0	0
To earth up four times	4	0	0
Four weedings, 3 men at a time	3	0	0
Repairing the furrows, 4 men	1	0	0
To dig out, 6 men	1	8	0
To clean, 3 men	0	12	0
To boil, 6 men	1	8	0
To dry, 8 men	2	0	0
Earthen pots	1	0	0
Rent	4	0	0
TOTAL	32	0	0

Mature.
2440

It is not stated whether the cost of a year's cultivation is the latter being a third of the former. Dr. McCann's extensive series of statements are made. Turmeric is planted in Rājshāhī in March to April and dug up a year later. In Sargodha it is planted in August, varies from 1 to 2 years. In Hugli it is planted in March and dug up a year later.

BENGAL.
2441Season of
planting.

general
Kumao
importa
grown

N. W. P.
2445

URCUMA
longa.

Turmeric

CULTIVATION

N W P

Cost,

2446

Profit

2447

BOMBAY.

2448

Yield.

2449

Lokhandi

2450

Aromatic.

2451

PANJAB

2452

2453

2454

MADRAS,

2455

er
in
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and
small
d, one
have
rains
up in
January "

Panjab — It is not apparently very extensively grown in the Panjab, at

turmeric for the consumption of the whole district" The Gazetteer further states that in the Kangra District there were, in 1880-81, 1,621 acres under this crop and in 1881-82, 1,520 acres

Madras — Turmeric cultivation is alluded to in various publications regarding South India, but no article has been found that deals with the Presidency collectively Of Coimbatore it is stated that it is usually grown as a mixed crop with yams, maize, castor, brinjal, onions, &c "The soil is thoroughly prepared by repeated ploughing and heavy manuring, municipal sweepings and ashes being a favourite manure." "In June or July, the soil having been ridged up about 2 feet apart, the rhizomes are planted, a cubit or less from one another, on the ridges and thereafter watered every three or four days until the end of December, thenceforward somewhat less often till March and April, when they are dug up The crop is hoed and weeded several times in the first four months The other crops are variously planted, the onions on the

CURCUMA
longa.

Turmeric.

PREPARA-
TION.
PANJAB.
2462
MADRAS,
2463

the roots are soaked in lime juice and borax before being powdered instead of being boiled." Of the Panjáb, Mr. Baden Powell says the tubers are taken up in November and dried partly by the action of fire and partly by exposure to the sun. Of Coimbatore it is reported: The roots are carefully sized and separately boiled in a mixture of cow-dung and water, dried and sent to market."

AREA.
2464

AREA UNDER TURMERIC.

	Acres.
Bengal (according to Dr. McCann) perhaps	30,000
Madras	15,000
Bombay	6,000
Berar	2,000
Panjáb	3,500
TOTAL	56,500

TRADE.
2465

TRADE IN TURMERIC.

Regarding the Indian Foreign trade in this article Mr. O'Connor, in his Review of the Trade in 1875-77, wrote "Turmeric was exported to the value of 10½ lakhs of rupees, the quantity being 123,824 cwt. This article has hitherto been recorded in the returns under the heading 'Spices,' but it is more appropriately classed as a dyeing material. It is not really a spice but rather a condiment, and for this purpose

Foreign.
2466

portance. In 1881-82 the exports were 70,783 cwt, valued at Rs. 66,047, as compared with 1877-78, when they amounted to Rs. 40,189. In 1885-86 the trade had so far recovered itself that the exports amounted to 156,287 cwt, valued at close on 14 lakhs of rupees. Last year they amounted to 140,994 cwt., valued at Rs. 10,32,025.

Internal.
2467

Full particulars cannot be learned as to the extent of the internal trade, but it must be very extensive, and even a trans-frontier trade exists. Kashmir receives a considerable amount. The various Indian ports last year exchanged 281,117 cwt of turmeric valued at Rs. 24,38,260.

HISTORY
2468

HISTORY OF TURMERIC

Turmeric yields a yellow dye of a fleeting character, which formerly was far more extensively employed by the natives of India than at the present day. Its chief features that recommended it for decorative purposes at marriage ceremonies, &c. were cheapness, ease of preparation, and facility of being removed. But these are conditions even more readily attained by aniline colours, while glaringly brilliant results are obtained, and, consequently, even religious injunctions have

Turmeric.

CURCUMA
longa.

to a certain extent given place to the encroachments of the tar dyes. Writing of this subject Dr. McCann (*in his Dyes and Tans of Bengal*, p. 85), says: "Formerly on festive occasions an infusion of turmeric

HISTORY.

Wedding
Garments.
2469

ing off the evil eye.
all the body with it as

Cosmetic,
2470

in the sect of Vishnu
make the peculiar

Markings on
Foreheads,
2471

st Provinces, says:

Dye Fleeting.
2472

be rendered permanent as a dye." It is somewhat remarkable that John Huyghen Van Linschoten, who spent several years on the Malabar coast from about the date of 1596, should describe the rates of people he met with, going into every detail as to their social habits, domestic and

He describes Car-
Tamarind, Ginger,
ration of curry and

chutney makes no mention of the habit of eating turmeric or of dyeing

nizable by mere verbal descriptions. The principal sorts now in commerce

C. 2472

CURCUMA
longa.

Turmeric.

HISTORY.

Cochin
Doubtfully
True Tur-
meric
2473

the trade of Cochin, makes no mention of turmeric, but at the same time references occur, of turmeric as employed in Europe about the time of which

is horny and of a deep orange-brown, or when in thin shavings of a brilliant yellow. Mr A Forbes Scaly of Cochin has been good enough to send us (1873) living rhizomes of this Curcuma, which he states is mostly grown at Alwaye, north east of Cochin, and is never used in the country as turmeric, though its starchy tubers are employed for making arrowroot. (Conf with *C. angustifolia* and other sources of East India arrowroot.)

DYE
2474
Dye-Yielding
Rhizomes.
2475

TURMERIC DYE

Dye.—It has already been stated that a special form of turmeric is grown for this purpose, namely, a harder root, much richer in the dye principle than in the ordinary condiment form. This dye rhizome receives separate names in the various provinces of India, but is most generally known by the name *lok handi haladi*, other dye forms are as *mala-haldi*, *jowala-haldi*, and *amb-haldi*. Under the paragraph, above devoted to an account of the preparation of the tuber, mention has also been made of the further process which the dyer has to adopt in

Yellow.
2476

The colour is only deposited in the rhizome with age, and hence, in all probability, the above mentioned forms have been obtained by a process of careful selection of stock observed to produce the colour freely. It is of importance, however, that the European merchant, in purchasing for dye purposes, should see that he gets the hard dye-yielding form and not the softer aromatic condition which is used as a condiment. Although, of course, turmeric is still employed by itself as a simple and cheap dye, its more general use at the present day in India, is as an auxiliary to other dyes and in Calico printing. It is also used to some extent to impart a colour to native-made paper. Mordants are but rarely required with the dye, as it is found to attach itself readily enough to wool, silk, or cotton. Alkalies deepen the colour, making it almost red. Alum is said to purify the colour and to destroy all shades of red. The dyers of Calcutta produce a brilliant yellow, known

Green.
2477

(Carbonate of Soda) this process "Here tint, produced always is are sometimes employed with turmeric, but the chief compound colour in which turmeric plays an important part is the green shades formed along with indigo. The fabric is first dyed with indigo and then dipped in a solution of *haldi*. Turmeric is also often added to sharpen or brighten other colours, as, for example, *Singrahar* (*Nyctanthes arbor-tristis*), lac dye, *al* (*Morinda tinctoria*), safflower (*Carthamus tinctorius*), and *toon* (*Cedrela Toona*).

C. 2477

Turmeric.

CURCUMA
longa.

The Indian Calico-printers use turmeric by preparing a mixture of 4 gallons of water containing pomegranate rind and alum in the following proportions:—Turmeric 5lb, pomegranate rind 2lb, and alum 1½lb. The compound is left to stand for a night, the surface water strained off, and ¼lb of indigo added. It is then prepared for use by being thickened with gum, clarified butter, and flour in the usual way. The colour is greenish yellow and is fleeting." (*Buck, Dyes and Tans of N.-W. P.*, 55)

The rhizome is used in the aniline industry. very fugitive char.

CALIC
PRINTING.
2478

EUROPEAN
USES.
2479

Cotton.
2480

Wool.
2481

Silk.
2482

Curcumin.
2483

Curcumin, and the
a new body
n. The sub-
st with pure
is dried, and
and 1 part of
s on cooling
By pseudo-
C. 2485

Action of
Boric Acid.
Red color.
2484

Rosocyanin.
2485

CURCUMA	
longa.	Turmeric.
EUROPEAN USES	curcumin is understood the organic resinoid substance resulting from the prolonged action of water upon boro-curcumin, just above-mentioned
Blue Color, 2486	nia turns the alcoholouration changes niacal solution red the alcoholic solu-
Colouration of Flowers, Cyanin. 2487	cyanin (also called roscocyanin) and pseudo-curcumin are unknown, neither was, until July,
Printing Silks 2488 Sour Browns 2489 MEDICINE. 2490	alkalies If this suggestion proves correct, on more precise investigation turmeric could become a useful source of preparation of the red colouring matter of flowers, which it is very difficult to obtain by direct extraction ermanence back the id dyeing it is now employed to a vast extent in stam-dyeing, forming an important constituent in certain compound colours, especially the so-called "sour browns." Medicine Used as a tonic in cases of debility, and as a small applied parasitic medici- in affec- "The se of a decoction of turmeric in purulent conjunctivitis, he says it is very effectual in relieving the pain In coryza he states that the fumes of burn-
Special Opinions — § "The root, parched and powdered, is given in bronchitis in doses of grs xxx to xl" (Civil Surgeon of Anderson, M.B., Bijnor) "The smoke produced by sprinkling powdered haldi over burnt charcoal will relieve scorpion sting when the part affected is exposed to the smoke for a few minutes A paste made of fresh rhizome is applied on the head in cases of vertigo Fresh juice is cooling Fumes of burning root is employed during hysteric fits" (Assistant	

Turmeric; Long and Round Zedoary

CURCUMA
Zedoaria.

MEDICINE.

powdered root is used as a fumigation in commencing catarrhs. The inhalation is generally taken at night and no fluid is allowed for some hours afterwards. The effect is said to be in many cases a complete cure.

and is used for colouring confections, &c.

Chemistry of Turmeric.—Dr. Dymock gives a brief sketch of the chemical history of this subject which should be consulted. "Curcumin, the yellow colouring matter of turmeric, has been examined by several chemists, whose experiments have led to the conclusion that its formula is either $C_{10}H_{10}O_2$ or $C_{14}H_{14}O_4$, that it melts at 172° , forms red brown

FOOD.
Condiment.

2491

Curry

Powder.

2492

CHEMISTRY.

2493

Curcuma pseudo-montana, Graham

2494

Vern.—*Sinderwani, sinderbur, sindelwan, hellounda*, BOMB

Habitat.—Said to be a native of the Konkan, springing up at the beginning of the rains.

Food.—"The tubers, which are perfectly white inside, are boiled and eaten by the people during seasons of scarcity. Perhaps this plant, too, yields a part of East India arrowroot, that which comes from Ratnâgiri is manufactured from its tubers" (*Lisboa, Dals and Gibs*).

FOOD
Rhizomes.

2495

Arrowroot.

2496

2497

C. rubescens, Roxb

Habitat.—"A native of Bengal, flowering time in the months of April and May, soon after which the leaves appear, and decay about the beginning of the cool season, in November. Every part has a strong but pleasant aromatic smell when bruised, particularly the root" (*Roxb*).

Food.—Roxburgh and Voigt say the pendulous tubers of this species yield a form of arrowroot.

FOOD.
Arrowroot.

2498

2499

C. Zedoaria, Roscoe (non-Roxb); Wight, Ic, t. 2005.

THE LONG AND THE ROUND ZEDOARY.

Syn.—C. ZERUMBEET, Roxb

C. 2499

CURCUMA
Zedoaria.

Long and Round Zedoary.

Vern — *Kachura*, HIND; *Sati*, short, *kachura*, BENG.; *Sati*, *karch*
SANS; *Zurumbdd*, ARAB.; *Kashur*, *uruk-el-kifur*, PERS; *Kach*
BOMB; *A*

paddala, *A*

kishanna, *A*

Fleming, *I*

References —

274; *Rheed*,

232; *A*

Dispen

Mot

77; *A*

U S

Planc

I, 159

Ind

Birdwood, *Bomb Pr*, 87; *Balfour*, *Cyclop*, 859; *New Off Guide to*

Indus of Ec Bot, 62

Habitat — *Roxburgh* says it is a native of Chittagong, from which pl

ABIR.
2500

2501

reviewed the scientific names of the species of *Curcuma*. The *Shafi* he
for the past forty years, been regarded as *C. Zedoaria*, *Roscoe*, whi
Dr McGann gives it as *C. Zerumbet*, *Linn*, — a name which does not exi
in botanical literature. If he means *C. Zerumbet*, *Roxb*, not *Linn* (a
synonym for *C. Zedoaria*, *Roscoe*) it is unfortunate he did not publi
his economic information under the modern name, since the name
C. Z.

solc

The

to c

common. In Bengal the rootstocks of *C. Zedoaria* *Roscoe* are used

Zedoary.
2502

MEDICINE
Rhizomes
2503

C. 2503

Long and Round Zedoary; the Dodder

CUSCUTA
reflexa.

properties Employed in native practice as a stomachic, and also applied to bruises and sprains "The natives chew the root to correct a sticky taste

MEDICINE.

Special Opinions — § "The rhizome of this plant is the *Amba-haldi* of the Bombay bazar Bruised with alum in water, it is applied to bruised joints and other parts to remove echimoses" (*Assistant Surgeon Sakharam Arjun Ravat, L. M., Girgaum, Bombay*) "Small bits of the rhizomes are put in the mouth and chewed to allay cough" (*Assistant Surgeon Anund Chunder Mukerji, Noakhally*) "Demulcent, expectorant, and aromatic, dose about 1 drachm" (*Civil Surgeon John McConaghey, M.D., Shahjahanpore*) "The rhizome is considered to be a cooling medicine, also tonic and expectorant" (*Surgeon-Major J. M. Houston, Durbar Physn., Travancore, and Civil Apoth. John Gomes, Medical Storekeeper, Trevandrum*) "This is the *Kachora* of the bazar It is used as an odoriferous ingredient of the cosmetics used for the cure of chronic skin diseases and internally as a mild aromatic stimulant in fever and colds" (*Assistant Surgeon Sakharam Arjun Ravat, L. M., Girgaum, Bombay*) "The roots imported into Leh as *kachür*, *judwar*, and called by the Bhotas '*Boshrga*' employed in Yarkand for washing the body, acting as a rubefacient (*Surgeon Major J. E. T. Aitchison, Simla*) "The rhizomes are used by singers as a masticatory for clearing the throat of tenacious mucus, they are also used in cases of irritation of the fauces

Judwar of
Yarkand.
2504

Linn, see A 430

Perfumery — The rhizomes of this plant constitute one of the most important articles of native perfumery

PERFUMERY.

Trade — Dymock says the Bombay supply comes from Ceylon, value Rs 20 to Rs 30 per candy of 7 cwt; as already stated, Roxburgh affirms that Bengal gets its supply from Chittagong

2505
TRADE
2506Curcuma Zerumbet, *Roscoe (non Roxb)*

2507

The writer is unable to isolate the economic facts recorded by certain authors under this name from those given for *Curcuma Zedoaria*, and he suspects that all refer to one and the same plant, or to Roxburgh's *Zingiber Zerumbet*

CUSCUTA, Linn, *Gen Pl.*, II, 881.Cuscuta reflexa, *Roxb*; *Fl Br. Ind.*, IV., 225, CONVOLVULACEÆ

2508

THE DODDER

Syn — *C. GRANDIFLORA*, Wall; *C. VERUCOSA*, Sweet, *C. MACRANTHA*, Don
Ve—

CUSCUTA
reflexa.

The Dodder or Cuscuta.

Some confusion exists regarding the vernacular names given to the species of *Cuscuta*. *Dymock* describes three species, two of which he has not determined botanically: he gives *Atāzeli* as the local Bombay name for *C.*

in the Western Himalaya, growing on the spiny plant—*Prinsepia utilis*. *Roxburgh*, who first described that species, states that it was found growing on *Crotalaria juncea*. The *Flora of British India* justly remarks that it is a puzzle to know where *Roxburgh* found it since the species, as known to modern botanists, does not occur much below 6,010 feet. It is distributed from Simla to Kashmir, Beluchistan and Afghanistan. *Roxburgh* gives it the name of *algusi*, and calls *C. reflexa* *kudi-algusi lata*, a name doubtless given in allusion to the yellow colour of the whole plant when mature. *Stewart* distinguishes four species, *C. macrantha*, *Don*—the *nīlā thāri*; *C. pedicellata*, *Led* (the *kwiklapot*, *arand* or *amīā*), *C. planiflora*, *Fenore*, and *C. reflexa*, the *dāsbel*, *astimun*, *kāsūs*.

Habitat.—An extensive parasitic climber, making the trees quite hoary upon which it occurs, often growing to such an extent as to completely cover every bough and leaf. It occurs throughout the plains of India and ascends the Himalaya to about 8,000 feet.

Dye.—*Mr. Baden Powell* states that at Jhelam this plant is sometimes used as a dye. It would be a great matter if it could be utilised in this manner, as many trees are often completely covered and often killed by the plant. The dye is apparently unknown in Bengal. *Mr. Baden Powell* does not mention the colour, it is probably a yellow. *Drury* says it is

DYE.
2509

MEDICINE
Plant
2510

Seeds,
2511

Stems.
2512

FODDER.
2513

Dymock says of the Persian dodder—*Astimun*—that it "has a bitter taste, in Arabic and Persian works it is described as the *Astimun* of the Greeks, which had so great a reputation as a remedy in melancholy madness; it is still a medicine of importance with the hakims of India,

dis-
tant
ation

"*Edgeworth* mentions that the mountaineers believe that crows pluck sprigs of this to drop into water, when they become snakes, and so furnish food for them."

C. 2513

The Guar.

CYAMOPSIS
psoraloides.

Cus-cus (khus-khus), see *Andropogon muricatus*, A. 1097.

Cuscus seeds, see *Papaver somniferum*

Cusparia or Angustura bark, see *Galipea Cusparia*, St. Hil., RUBIACEÆ.

Custard Apple, see *Anona squamosa*, A. 1166.

Cutch, see *Acacia Catechu*, A. 135.

Cuttle-fish, see *Molusca*.

CYAMOPSIS, DC.; *Gen Pl.*, I, 493.

Cyamopsis psoraloides, DC ; *Fl Br. Ind.*, II, 92, LEGUMINOSÆ

2514

Vern.—Guar, darakh, kumara, kauri, syansundari, phalgawar, kachhur, khurli, khultli, N-W P., and OUDH, Guwar, Guj, Gauri, mutki, gamar, Bomb., Buru raker, SANTAL, Paj panson, BURM. (*Kurz, Pegu Rept.*)

Habitat.—Cultivated in many parts of India from the Himalayas to the Western Peninsula. It is a robust erect annual, 2 to 3 feet high, grown as a rainy season crop.

Cultivation.—In the Bombay Gazetteer (Gujarat) it is said to be grown as

CULTIVA-
TION.
2515

different purposes,—as a vegetable for human consumption, and as a pulse for horses and cattle. For the former purpose it is invariably grown on highly manured land near villages, and assumes a much more luxuriant habit of growth than when grown for cattle. The portion eaten as a vegetable is the pod, which is plucked while green, after the fashion followed with the French beans of English gardens. As a cattle fodder it is grown for its grain and is then sown on light sandy soil, side by side

FOOD
Vegetable.
2516
Horse-food.
2517
Pulse
2518
FODDER.
2519

stri:
catt
fod

in Fatehpur and Allahabad. The value of a purchased animal is

CYANOTIS
tuberosa.

The Spider worts

noticed It occupies there more than ten times as large an area as in any other Division The cultivation of guar also reaches its maximum in the same tract and is an indication of the care of agricultural stock which one

the Panjab proper which exhibits a sample, the pulse is stated by the

CYANANTHUS, Wall ; Gen Pl, II 557

2520

Cyananthus, sp. (? *C. limfolius*, Wall), *Fl Br. Ind*, III, 434, [CAMPANULACEÆ

Vern — *Murra*, Pa

Habitat — A plant with pretty blue flowers, growing at 10 000 to 12 000 feet in Chumba "

MEDICINE
2521

Medicine — The calyces are eaten, being mawkish sweet, and are said to be good for asthma " (*Stewart, Pb Pl*)

CYANOTIS, Don ; Gen Pl, III, 851, Wight, Ic, t. 2082 & 2089

2522

Cyanotis axillaris, *Ram et Schultes, DC, Monogr Phan*, III, 244, *Clarke's Commelinaceæ, table 35, COMMELINACEÆ*

ONE OF THE SPIDER WORTS

Vern — *Nurpi li* (Rheede), TAN, *Soltraj*, *bagha-nulla* (Ainslie), HIND *Itsaka* (Lisboa), BOMB

MEDICINE
2523

Habitat — A herbaceous annual, met with in many parts of India, distributed to the Malay, China and Australia

Medicine — Rheede says that on the Malabar coast this is viewed as a

FAMINE
FOOD
Seeds
2524
2525

of this as also of *Commelina communis*, were eagerly sought for during the Bombay famine, they are wholesome and nutritious

C tuberosa, Ram & Schultes, DC, Monogr Phan, III 249

Syn — *TRADESCANTIA TOBEROSA* Roxb C *ASCENDENS* Dals in Hook *Jour Bot* p 343 (1852), C *SARMENTOSA*, Wight Ic, 2087

MEDICINE
Root
2526
FOOD
Leaves
2527

Vern — *Mera n chunchi* (a name given from the resemblance of the roots to the pap flae of the goat) *Hodo jereng arak* (the vegetable) SANTAL

Medicine — The Rev A Campbell says the ROOT is given in long continued fevers and also for worms in cattle

Food — The LEAVES are eaten by the Santals as a pot herb

C. 2527

SEIR FISH, Cycas or Sago Plant

CYCAS
RumphiiCYBIUM, *Cu*, *Dsj*, *Fishes of Ind*, 254Cybium Commersonii, *Cur. & Val*

SEIR FISH

Vern.—*Sermi*, HIND *Junjurrum* (male) *Kam* (female), TEL, *Konam*, *mah-wu luachi* or *ah ku lah*, TAM, *Chumbum*, MAL

Habitat

Medic

mended.

Quart A

taste of

to putrify

2528

MEDICINE,

Oil

2529

CYCAS, *Linn*, *Gen Pl*, III, 444

2530

The brief notes here given of the species of CYCAS will be found supplemented under SAGO. This has been rendered necessary, from its being often difficult to discover to which plant the earlier writers refer

Cycas circinalis, *Linn*, *DC Prod XVI*, II, 526, CYCADACEÆ

2531

Syn.—*C SPHERICA*, *Roxb*, *Fl Ind Ed C B C*, 709, *C CIRCINALIS*, *Linn* in *Thraites En Ceylon Pl*, 294, *TODDER PANNA*, *Rheede*, *Hort Mal III* 9Vern.—*Ora-smaro* URIVA *Madda*, SING Under *Cycas circinalis*, *Linn*, *Ainslie* gives the following names which all appear to refer to Sago and not necessarily to CYCAS.—*Show arisi*, TAM, *Saouhi chawai*, DUK, *Sabudana* HIND, *Zombium*, TEL, *Sagu*, MAL, *Sekuhme*, SING, *Sagu*, JAVA, *Sagu*, BALI (*Mal Ind I*, 361)

Habitat.—A palm-like tree met with on the mountains of the Malabar coast and in Ceylon

FOOD,

Seeds.

2532

Flour.

2533

2534

C. pectinata, *Griff* as in *Kurz*, *For Fl Burm*, 503Vern.—*Tlatat* NEPALHabitat.—An evergreen simple-stemmed palm like tree, found in Sikkim, Eastern Bengal, and Burma, often in *sal* or *eng* or pine forests (*Gamble*)

FOOD

Sago

2535

TIMBER

2536

C. revoluta, *Thunb*

2537

Often called the SAGO PALM OF JAPAN AND CHINA

Habitat.—A Japanese species often cultivated in India, has a short thick stem

C. Rumphii, *Miq*, *Gamble*, *Min Timb*, 415

2538

Syn.—*C CIRCINALIS* *Roxb*, *Fl C B C*, 709Vern.—*Bara gudu*, TEL, *Tollimaran*, MAL; *Mondang*, BURM

252

C 2538

Quince

CYDONIA
vulgaris.

MEDICINE

who occasionally order an infusion or decoction of the seeds as a demul-

tum, cephalic, and
 eup, and BARK of
 account of their astri
 mo et, and slightly a
 native practice, the
 plants as a demul
 blisters" (*Dismock*)
 author:—"The seed

Fruit
2549Bark.
2550Mucilage
2551

corresponds in composition with that of linseed "

The seeds coagulate 40 times their weight of water (*Pharmacographia*)Special Opinions—§ "A cold infusion of the seeds forms a pleasant demulcent drink, which is much used in native practice in cases of irritation of the urinary organs" (*Pharmacographia*)

"I use it as a de
 about one drachm
 are known here as
 plaints and semir
 Ahmedabad), Qu

t demulcent
 of diarrhoea

ly juicy and
 odour, is often used to flavour marmalade and other preserves. Wine is
 sometimes made from it. It is supposed by some to have been the
 Golden Fruit of the Hesperides
 cially near Naggar), and the fruit is

FOOD,
Fruit.
2552

seed are largely imported into
 the fruit is eaten fresh, candied
 istan excels all other quinces
 no other fruit of remarkable g
 Flora makes no mention of

the
 of 5, 3, 2, according to quantity. Moodeen Sherif points out that *Beh-
 dānah* and *Bé-dānah* are so much alike in sound that mistakes are likely
 to be made. The latter is the name for a peculiar seedless raisin but
 is often loosely applied to all raisins.

TRADE.
2553Cymbopogon, see *Andropogon*; GRAMINEÆ.C. citratum, DC., see *Andropogon citratus*, DC., A. 1079C. laniger, Desf., see *Andropogon laniger*, Desf.; A. 1093C. Martini, Roxb.; Munro, see *Andropogon Schoenanthus*, Linn.; A.

1117

C. 2553

CYNODON
Dactylon

Artichoke, Doorwa Grass

Cymbopogon Nardus, *Linn*, see Andropogon Nardus, *Linn*, A. 1107

2554

CYNANCHUM, *Linn*, Gen Pl 762Cynanchum pauciflorum, *Br*, Fl Br Ind IV, 23, *Wight, Ic*, [354, ASCLEPIADEÆSyn — ASCLEPIAS TUNICATA *Roxb* Fl Ind Ed C-B C, 253 CYNANCHUM PAUCIFLORUM *R Br* in *Dalz & Gibs* Bomb Fl 148 CYNOCOTONUM PAUCIFLORUM *Deca* sic *Thwaites E* Ceylon Pl 195Vern — *Chagul pati* BENG *Kan kumbala* SINGHabitat — A large twining shrub met with in the Deccan Peninsula from the Concan southwards to Travancore and Ceylon. This is the region given in the Flora of British India, but according to Roxburgh (*Asclepias tunicata*), it is found in Bengal also.FOOD
Leaves
2555Food — The Cinghalese eat the young leaves of this and of many other plants of this natural family, in their curries (*Enumeratio Plantarum Zeylanicæ*, 195)

This does not appear to be the case in Bengal, Roxburgh simply remarking that its milky juice is particularly gummy

CYNARA, *Linn*, Gen Pl, II, 469

2556

Cynara Scolymus, *Linn*, COMPOSITÆ

ARTICHOKE

" " " " " " " " " " " "

",
an
d.

Habitat — Cultivated to a limited extent over most parts of India for the European market

FOOD
2557

Food — The lower parts of the thick imbricated scales of the flower-fleshy are eaten

the artichoke in
Minger says it is
than in England
of September 15suitable
days
be plac
art chok
from the
the begiCYNODON, *Pers*, Gen Pl, III 1164

2558

Cynodon Dactylon, *Pers* *Duthie* Fodder Grasses *N Ind*, 52, CREEPING PANIC GRASS or DOORWA, COUCH GRASSSyn — C STELLATUS *Willd*; PANICUM DACTYLON *Linn* PASPALUM DACTYLON DC DIGITARIA DACTYLON ScopVern — *D b dauria d bra kabbar khaddal talla tilla* *Ps B rava* TRANS INDUS, *Dob null dub*, *RAJ*, *Chibbur* SIND, *Dub, darbd, dābla*,

C. 2558

Dub or Doorwa Grass

CYNODON
dactylon.

BENG *Dhobi ghas* SANTAL, *Duba, kali ghas, rim ghas*, N W P,
Dhipsa kharali C P, *Durra, Saks, Durra, karala, karali*, MAR,
Arugam pilla, karali, TAM, *Ghericha, laryals* (UPPER GODAVERI),
 TEL

Mr. Baden Powell — — — — —

Ref — — — — —

Smith, Dic, 157

Habitat—A perennial 'creeping grass and flowering all the year round, grows everywhere throughout India, except perhaps in the sandy parts of Western Panjáb, where it is rare. In winter it appears scanty, at which time it may be said to be at rest. It abounds in the Sunderbuns. It is particularly abundant on road sides, ture of sand and gravel which it there. It is readily propagated by chopping pieces over the prepared soil. It asc of 7,000 to 8,000 feet. It varies considerably both in habit and nutritive qualities, according to the nature of the soil or climate. It makes good hay keeping for several years if carefully stacked.

Medicine—In the *Atharvana Veda* it is said: "May *Dúrba*, which rose from the water of life, which has a hundred roots and a hundred stems, efface a hundred of my sins, and prolong my existence on earth for a hundred years." U C Dutt says: "This elegant and most useful vegetable has a niche in the temple of the Hindu religion. Medicinally,

Hay
 2550
 MEDICINE.
 2560

sn
 wt
 pl
 la
 G
 G

chief mourner wearing a ring of the grass. The latter is sacred to Ganesh. Both grasses are indiscriminately used in compound prescriptions with

2561

Indies, caused by '*Pulex penetrans*'

Julca,
 2562

C. 2562

The Cynoglossum or Dog's tongue

CYNOGLOSSUM
micranthum.

Regarding the curing of hay the following remarks with reference to this grass are of value —

"Hariali, like most other meadow grasses, should be cut immediately the flower begins to appear, in this state the juices of the grass are more nutritious, and the hay is far superior than when made from the fully matured plant. Besides when cut before the seed appears, the plant is more vigorous and produces another crop much sooner. Hariali hay is generally considered to be one of the best for cattle and horses."

FODDER.
Hay.
2566

or at the most three days, should suffice for making the hay.

"Cutting should not commence until the dew is off the grass. The grass should remain on the ground for an hour or so after being cut. It should then be turned and tossed until sun-set. It cannot be tossed too much during a hot sun. To preserve the green colour and aroma of the hay it is absolutely necessary to keep it moving. At night, if the dews are heavy, it should be put up in small cocks, each containing from two to three cwt. The cocks should be covered with straw or thatch, and be able to be turned over at night."

of course putting it again into cock at night.

"Hay thus rapidly made is rich in saccharine matters, and is, therefore, very liable to heat and ferment, this, to a moderate extent, does no harm."

2567

eat abundance, and is of a superior
stward, it grows luxuriantly in the
rivers in the southern division, and
district. The juice of the leaves is used
(Topography of Dacca by J. J. J.)

2568

lor, 60)

CYNOGLOSSUM, Linn : Gen Pl. II, 848

Cynoglossum micranthum, Desf., Fl Br Ind, II, 156

Vern — Nilakras, Pa, Oudhuphull, Guj, Adhuphull, Zake, J. J. J.,
henda, SING

450

C. 2569

Mats and Matting.

CYPERUS
corymbosus

Cyperus bulbosus, Vahl., see *C. jemicus*, Rottb.; CYPERACEÆ.

2584

C. compressus, Linn.; Clarke in *J. Linn. Soc.*, XXI, 97

Vern.—*Chuncha*, BENG.; *Salitunga*, TEL.; *Wek-tanyet*, BURM.

References.—Roxb., *Fl. Ind.*, Ed. C.B.C., 65; *Dalr. & Gibs*, *Bomb. Fl.*, 242; *Cyperus* in *Griff. Ith. Notes* No 167, p. 12, and 191, p. 362; Kurr., *Rept.*, Pegu.

Habitat.—A common species throughout India, ascending the hills to 2,000 feet in altitude. A special form is known as *var. pectiniformis*. This is said to occur in Lucknow, Chutia Nagpur, and Assam. Thwaites says it is very common in the warmer parts of Ceylon. Roxburgh remarks that it "delights in a moist soil."

C. corymbosus, Rottb.; C.B. Clarke in *Jour. Linn. Soc.*, XXI, 158.

2585

Syn.—*C. SEMINUDUS*, Roxb., *Fl. Ind.*, Ed. C.B.C., 63; *Nees in Wight, Contrib.*, p. 80; *PAPYRUS PANGOREI*, *Nees in Wight, Contrib.*, p. 88, in part.

Vern.—*Gola mehti*, BENG.; *Godá tunga kúda* (Roxb.) and *Goddu-tunga kodu* (Elliot), TEL.; *Gal chu*, SING.

Habitat.—Found throughout India, and on the islands of Ceylon.

It should be observed that the name *C. Pangorei* is open to the greatest possible ambiguity. The Madras plant mentioned under that name by Dr. Bidie, CLE., is *C. corymbosus*, Rottb., *var. Pangorei*, Rottb., but *C. Pangorei*, Roxb., is *C. malaccenses*, Lam.; *C. Pangorei*, Thwaites, is *C. ...*

as one of
mats. It

FIBRE.
2586

MATS.
2587
Tinnevely.
2588

Palghat,
2589

CYPERUS
Haspan.

Sedges used for

Tinnevely, and the article is therefore heavier, coarser in texture, and not so flexible."

FODDER.
2590

Fodder.—"Cattle are not fond of it, and it is only eaten occasionally by buffaloes" (Roxb)

2591

Cyperus elegans, Linn, C B. Clarke, Linn Soc Jour, XXI, 125

Syn — *C. MESTUS*, Kunth; *C. MICROVIRIDIS*, Thw, En Ceylon Pl, 344

Vern — *Wek chan*, BURM (*Aura*, Pegu Rept)

Habitat — A native of Bengal and the Malay Peninsula, Sikkim 1,500 feet, Assam, Khasia hills 1,200 feet Sylhet, Yunnan, Chittagong, Mergui, Tenasserim, and the Andaman Islands

2592

C. esculentus, Linn, C B Clarke, Jour Linn Soc, XXI, 178

Syn — *C. TUBEROSUS*, Rottb

Vern — *Kaseru dila*, PB, *Sha ts'au* CHINESE

Habitat — There are five or six distinct forms of this plant, of which two occur in India *viz*, *forma tuberosa* (*sp* Rottb) in Madras and *forma hindustanica* in Northern India

MEDICINE
Root

Medicine and Food — Stewart says "In N.W. Provinces the root is used as food, and is officinal as *kaseru*. The *dila* root, mentioned by Bellew as eaten in the Peshawar valley, may be the same *dila*, however, appears to be a generic name for the CYPERACEÆ, the roots of several of which are eaten by pigs, and their stems, &c, browsed on by cattle, as is

2593

FOOD

Root

2594

FIBRE

2595

Coffee Sub-

stitute

2596

2597

C. exaltatus, Retz; C B Clarke, Linn Soc Jour, XXI, 186

Syn — *C. UMBELLATUS* Vahl according to Roxb, Fl Ind, Ed C B C, 69, *C. VENUSTUS* R Br, Thwaites En Ceylon Pl, 432 (*nec* Nees *nec* Kunth), *C. ALTUS* Nees, in Wight, Contrib, 84

Vern — *Pedda shaka*, TEL

Habitat — Commonly found in Bengal (Chuttia Nagpur, Rajmahal, Mysore, Madras, Central in "A large species, grow-

FIBRE.

2598

Mats

2599

able — This sedge is often used for matting, Mr C B Clarke de-

fore be held a distinct species but whatever it is called, it is

2600

C. Haspan, Linn, Clarke, Linn Soc Jour, XXI, 129

Syn — *C. UMBELLATUS*, Vahl, as the *Pedda shaka* of the Telugus.

C. 2600

[illegible]

Mats and Matting.

CYPERUS
SCARIOSUS.

MEDICINE.

dysentery in doses of about a scruple (*Med. Top of Dacca* by J. Taylor, p. 54). "In the Congo the fresh tubers are applied to the breast in the form of *lep* (maligma) as a galactagogue. *C. rotundus* is the *κνρεπος* of the Greeks and is mentioned by Dioscorides, who says it is the *Juncus* or *Radix Junci* of the Arabs. It is also an ingredient as an aromatic plant is mentioned in the *Iliad* (21, 351), and *Odyssey* (4, 603), and by Theophrastus in his fourth book, it appears to have been a favourite food of horses. Pliny (21, 18) calls it *Juncus triangularis* or *angulosus*; it is probably the *Juncus* of Celsus (3, 21) mentioned as an ingredient in a diuretic medicine for dropsy, although he calls it *Juncus quadratus*" (*Dymock*, p. 844). Arabian and Persian writers describe the drug as being used in doses as an ingredient.

cine) "The roots are in Chutia Nagpur used in 'fever'" (*Rev. A. Campbell*). "The fresh roots are stimulant and diaphoretic" (*Bombay Gazette* 11, p. 14).

Fodder.—Cattle eat this so-called grass, and hogs are remarkably fond of the roots.

FODDER,
2616

Cyperus scariosus, R. Br.; C. D. C., *Linn. Soc. Jour.*, XXI, 159

2617

Syn.—CYPERUS PERTENUIS Roxb., *Fl. Ind.*, Ed. C. B. C., 66

Vern.—Nagar mothā, HIND; Nagar mutha, BENG; Lamda Mar, Soade kaji, soad, ARAB; Mushke-samin, PERS; Nigur-mustaka, SANS; Nagar motah, DEC; Mutiah k ch, Koraik kishangu, TAM; Tinga gaddala vern, Kajatunga muste, TEL; Kera kishanna, MAL; Konnari gadde, KAN; Vomon nsh, BURM.

References.—Roxb., *Fl. Ind.*, Ed. C. B. C., 66. *Med. Top. Ajmer* 147, *Dymock Mat. Med. W. Ind.*, 2nd Ed., 815, *Irvine, Mat. Med. Patna*, 75. *Birdwood Bomb. Pr.*, 94; *Lotard, Dyes, Supp.*, IV.

Habitat.—A delicate, slender grass, met with in damp places in Bengal, Oudh, and rare in the Panjāb, by no means so common a plant as *C. rotundus*.

Nagar mothā, DUK, id II, 162) under the

Dye.—The rhizomes are used in dyeing to give a scent to the fabric, and as a perfume for the hair. Roxburgh describes them as "tuberous with many dark coloured villous fibres." "Its naked delicate form, small

DYE,
2618MEDICINE,
Root,
2619

C 2619

CYPERUS
setum

Sedges used for

MEDICINE

Cyperus, but consider it to be inferior to *C. rotundus*. "Two kinds of *Nagarmoth* are met with in the Bombay market—Surat and Kathiawar, the first is heavier and more aromatic than the second. Value, Surat, R2 per maund of 37½ lb, Kathiawar R1½. The Surat *Nagarmoth* is probably obtained from Rājputana, where the plant is common in tanks (Dymock). U O Dutt says "The root of *C. pectinatus* is somewhat tuberous with many dark coloured villous hairs. It grows in low wet places, and is chiefly used in the preparation of medicated oils."

Special Opinions.—§ Roots, when bruised have a fragrant smell, and for this reason native females keep a stock of the powdered root to wash their bodies with. (Honorary Surgeon P. Kinsley, Chicacole Ganjam Madras Presidency). "Is given in conjunction with Valerian in cases of epilepsy" (Surgeon-Major C W Calthrop, M.D., 4th Bengal Cavalry, Morin). "The root is astringent, useful in diarrhoea" (Surgeon-Major J. M. Houston, Durbar Physn, Travancore and Civil Apothecation is used in C' H Peacocke, Major Robb,

2620

Cyperus stoloniferus, Retz, C B Clarke, Linn Soc Jour, XXI, 172

Syn.—*C. LITTORALIS*, R Br., *C. TUBEROSUS* Baker

Vern.—*Jatama* is a name given in South India to this plant

Dwarf man A L L L L L L L L L L

FUMERY,
2621

called *Sanbal* in Hindi and *Sanbal-ul-tarb* and in Upper India *Jatama* and *Balchhar*. But as the true plant is only found at great elevations beyond the tropics, the long tubers of various species of grass (*Schænanthus*) are also under the names of

2622

C. tegetiformis, Roxb., C B C, Linn Soc Jour, XXI, 157

Syn.—*C. nudus* Roxb., Fl Ind, Ed C B C pp 63 and 70, *C. BENGALENSIS* Spreng

Vern.—*Gula-methi* BENG., *Sura* SINTAL

Habitat.—A native of low wet places over Bengal, flowering during the rains. (Roxb) Clarke mentions as localities—Calcutta, Chittagong, Noakhali, Burisal Mymensing, Pandua, and Assam. He also states that the plant occurs in China and Japan.

Fibre.—Roxburgh writes "This species is very like *C. tegetum*, and about the same size, though I am informed it is never used for mats. To know it from *C. tegetum* attend to the involucre, which in this is only about one-fourth the length of the umbel, but in that as long or longer."

FIBRE,
Mats,
2623

2624

C. tegetum, Roxb., C B Clarke, Linn Soc Jour, XXI, 160

Syn.—*C. CORYMBOSUS* Koenig in part *C. SCHIMPERIANUS* Steud.
C. DENISCENS Steud. *C. PANGOREI* Thwaites (non Rolfe) Enum
Pl Zeyl 344 *PATYRUS DENISCENS* Nees in Wright Contr b, 89; *C. PANGOREI*, Nees (the greater part) and *C. CORYMBOSUS*, Nees

C. 2624

5

of mind must show it exists, not generally but in reference to the particular matter in question. Two illustrations (e) and (f) of Section 43 of the Indian Evidence Act were not then in existence. Before 1891, Sec. 54 of the Indian Evidence Act runs as follows —

In Criminal Proceedings the fact that the accused person has been previously convicted of any offence is relevant, but the fact that he has a bad character is irrelevant unless evidence has been given that he has a good character, in which case it becomes relevant.

Explanation—In Ss. 52, 53, 54 and 55, the word character includes both reputation and disposition, but evidence may be given only of general reputation and general disposition, and not of particular acts by which reputation or disposition were shown.

In 1887 the Full Bench Case of *Queen Empress v. Kartie Chandra Das* 14 Cal. 721 was decided. The result of the Full Bench decision led to the passing of Act III of 1891. By this Act the following additions were made to Sec. 310 Cr. P. C. —“Notwithstanding anything in this section, evidence of the previous conviction may be given at the trial for the subsequent offence if the fact of the previous conviction is relevant under the provisions of the Indian Evidence Act, 1872.”

By Act III of 1891, Explanation 2 of Sec. 14 Indian Evidence Act was added which is as it is now. Read new section of the Evidence Act.

By Act III of 1891, Illustrations (e) and (f) of Sec. 45 Evidence Act are added. Read these illustrations.

By Act III of 1891 the Sec. 54 of the Evidence Act was modified.

In the case reported in 1 C. W. N. 146, the previous convictions are held to be inadmissible. The Public Prosecutor in reply put the 2nd and 3rd points together and said that previous convictions are evidence in this case as evidence of habits. He referred to 27 Cal. 129 16 C. W. N. 69.

3rd. point—If the Public Prosecutor wants to put in the previous conviction not as evidence of habits, he cannot be guided by the provisions of the Indian Evidence Act. Because under the Indian Evidence Act, it is only relevant as evidence of character. Therefore the procedure must be followed as provided in Sec. 310 (a) 1, 2, Cr. P. C. The case reported in 31 C. L. J. 192 supports the defence.

The Judge overruled the contention of the defence. The objection was made to the statements of the occurrences which were not reported to the police station. Section 8, Illustration (k) Sec. 22 C. L. J. and Sec. 157 of the Indian Evidence Act were relied upon. The Judge overruled the contention.

The approver wrote a letter from Burdwan. The prosecutors wanted to put that in—the defence objected to it on the ground that it is not admissible in evidence. In Sec. 17, Indian Evidence Act, admission has been defined. The letter is a document—it is not an admission within the meaning of Sec. 19, Indian Evidence Act. It can alone be

proved against the approver. Sec 21 Cl (1), Indian Evidence Act does not apply because it cannot be relevant under Sec 32, Indian Evidence Act. Cl (2) does not apply because it does not state any thing about any state of mind or body. Cl 3 would have been applicable if Sec 10 of the Evidence Act was applicable. But as Sec 10 was not applicable, Cl (3) can not help in any way. A statement is not admissible in favour of the person making the same unless it comes under Sec 32 or Sec. 137 of the Indian Evidence Act. Sec 137 must be read with Sec 3 of the Evidence Act. It is neither a relevant fact nor a fact in issue. The Judge over ruled the contention of the defence.

It took a long time to finish the Examination in Chief and the cross examination of the approver. During the cross examination of the approver—his statement before the police was supplied to the defence in accordance with Sec 167, Cr P C. The approver was also cross examined with reference to such statement.

After the approver's evidence the verifying Magistrate was examined by the Prosecution. The leader of the defence mentioned that the verification proceedings are illegal. No section of the Criminal Procedure Code authorises such a procedure. Taking for granted that such proceedings are not wholly illegal so far as the police work is concerned, the statements made to the verifying Magistrate in course of such proceedings are inadmissible. The following are the cases in support of the above proposition of law.

(i) 7 C W N 220

(ii) 15 C W N 593

(iii) 22 C W N 593

If the verification proceedings and the statements made before the verifying Magistrates are admissible then the brief of the public prosecutor and the instructions given to him will be admissible.

The Judge declined to mark the report of the verifying Magistrate. After the examination and the cross examination of the verifying Magistrate all other witnesses were examined and cross examined.

Thereafter the examination of the accused duly recorded by or before the committing Magistrate was tendered by the Public Prosecutor and read as evidence. The evidence of some of the witnesses duly recorded in the presence of the accused by the committing Magistrate was treated as evidence in the case. The accused were all one by one asked questions whether they are willing to make statements explaining the circumstances appearing in the prosecution evidence against them. They made certain statements the gist of which is given in the heads of charge. The accused persons were then asked whether they meant to adduce evidence. All of them said that they did not want to adduce any evidence. The Public Prosecutor then summed up his case. He began his arguments on the 1st May 1925 and closed the same on the 27th May 1925. The leader of

the defence opened his case, stating the facts or law on which he intends to rely and making such comments as he thought necessary on the evidence for the prosecution. He began to sum up his case on the 18th May 1925 and closed his summing up on the 4th June 1925. As no evidence was adduced on behalf of the defence, the prosecutor had no right of reply. It was, it first, thought that the Jury should view the places in which the offences charged were committed but the Judge thought it unnecessary for the purpose of the present case. The Judge charged the Jury on 12th, 13th, 17th, 20th, 21st, and 25th June 1925 during the usual court hours but the charge was not finished. He began to charge the Jury on the 26th June from 11 a.m. and continued it till 11 p.m. when the charge was finished.

It is the duty of the Judge (a) to decide all questions of law arising in the course of the trial and especially all questions as to relevancy of facts which it is proposed to prove, and the admissibility of evidence or the propriety of questions asked by or on behalf of the parties, and in his discretion to prevent the production of inadmissible evidence, whether it is or is not objected to by the parties, (b) to decide upon the meaning and construction of all documents given in evidence at the trial, (c) to decide upon all matters of fact which it may be necessary to prove in order to enable evidence of particular matters to be given, (d) to decide whether any question which arises is for himself or for the Jury, and upon this point his decision binds the Jurors. The Judge in course of his summing up expressed to the Jury his opinion upon the questions of fact. He mentioned about the reliability of witnesses and about the guilt of the accused. He also asked the Jury to form their own opinion (1 L. L. 10 Cal. 970). The Judge delivered his charge with sufficient fulness to the Jury and in such a way as to enable one to say that all points of law and fact were clearly and correctly explained to the Jury having regard to the evidence adduced in the case. See 31 C. W. N. 357, 51 Cal. 698.

I propose to append to this book the materials which contain the synopsis of the entire evidence that could be found in the records of the Alipore Sessions Court as well as of the examination of the accused persons. Although the Judge expressed his opinion on questions of fact, sometimes very strongly, one cannot think it to be influencing the Jury so that their function might be reduced only to registering the opinion of the Judge and bring in a verdict according to his idea. See 31 C. W. N. 351. Strictly speaking there was not the slightest misdirection. The charge was entirely in favour of the accused persons. The heads of charge entirely adopted the arguments of the defence.

After the Judge finished his charge the Jury retired to consider their verdict. They retired at 11-45 p.m. on the 25th of June 1925 and delivered their verdict at 4 a.m. on the 27th of June. The Jury were locked up

during their deliberations. It is duty of the Jury (a) to decide which view of the facts is true and then to return the verdict which under such view ought according to the direction of the Judge, to be returned, (b) to determine the meaning of all technical terms (other than terms of law) and words used in an unusual sense which it may be necessary to determine, whether such words occur in documents or not, (c) to decide all questions which according to law are to be deemed questions of fact, (d) to decide whether general indefinite expressions do or do not apply to particular cases, unless such expressions refer to legal procedure or unless their meaning is ascertained by law in either of which cases it is the duty of the Judge to decide their meaning.

Difference between Mofussil Sessions trial and High Court Sessions trial —

Practically speaking there is no difference. Only matters in which there is a difference are as follows —

High Court

(1) All trials before a High Court are by Jury

(2) In trials before High Court when it appears to it at any time before the commencement of the trial of the person charged that any charge or any portion thereof is clearly unsustainable, the Judge may stay proceedings upon the charge or portion of charge

(3) In trials before the High Court the Jury consists of nine persons

(4) In capital cases and in cases where Judge so directs the trial shall be by a special Jury

Mofussil Court

(1) All trials before Mofussil Courts are either by Jury or with the aid of assessors

(2) No such provisions in mofussil

(3) In Mofussil Courts the Jury consists of such uneven number not being less than five or more than nine as the Local Government may direct. Provided that in capital cases the Jury shall consist of not less than seven persons and if practicable of nine persons

(4) In any district for which the Local Government has declared that the trial of certain offences may be by special Jury the Jurors shall in any case in which the Judge directs be chosen from the Special Jury list

High Court

Mofussil

(5) Objections to a particular Juror shall be allowed to number of eight on behalf of the Crown and eight on behalf of the accused without any ground whatsoever

(5) In Mofussil no objection to a Juror is allowed without any of the grounds mentioned in Sec 278 Cr P C

(6) When in a case tried before High Court the Jury are unanimous in their opinion, or when as many as six are of one opinion and the Judge agrees the Judge shall give judgment in accordance with such opinion. When in any case the Jury are satisfied that they will not be unanimous but six of them are of one opinion, the foreman shall so inform the Judge. If the Judge disagrees with the majority, he shall at once discharge the Jury. If there are not so many as six who agree in opinion the Judge shall, after the lapse of such time as he thinks reasonable, discharge the Jury.

(6) If in any case before the Mofussil Court the Judge disagrees with the verdict of the Jurors or of a majority of the Jurors as to all or any of the charges on which any accused person has been tried, he shall refer the case to the High Court.

(7) The clerk of the Crown shall prepare the list of common as well as special Jurors.

(7) Sessions Judge and the Collector of the District or such other officer as the Local Government appoints in this behalf, shall prepare the list of Jurors.

(8) The Advocate General may stay proceedings.

(8) No such provision in Mofussil.

(9) The Chief Justice shall appoint time of holding Sessions.

(9) No such provision in Mofussil.

(10) The High Court shall hold its sittings at the place at which it now holds them, or at such other place (if any) as the Governor (General in Council in the case of the High Court at Fort William or the Local Government in the case of the other High Courts may direct.

(10) No such provision in Mofussil.

High Court.

Mofussil

(11) The Chief Justice shall (11) no such provision in
 notify beforehand in the Local Mofussil
 Official Gazette of all sittings of
 the Criminal Session intended to be
 held

The result of the Saldah Gang case was some of the accused were convicted and others were acquitted. The convicted persons preferred an appeal to the Hon ble High Court and the appeal was dismissed.

(b) Pakur Case—Case against Dr Sivapada Bhattacharyya —

Mr T H Ellis, District and Sessions Judge, Alipore heard the case with the aid of Jurors. Many eminent advocates appeared on behalf of the several accused in the case. Dr Sivapada was represented by Mr P N Banerjee, Advocate.

Facts—Rani Suryabati of Pakur had a separate estate with an income of Rs 20,000 annually. She had brought up Amarendra who had lost his mother in his infancy. On the death of his father, Amar prosecuted his studies at Patna while Benoy managed the estate. Benoy was irregular in remitting money to Amar, so Rani Suryabati supplemented in. Amar had passed the intermediate examination in arts and decided to read for the B.A. degree. After the death of Benoy's father, Rani Suryabati lived away from Pakur as Benoy took a woman there and accommodated her. During Pujas in 1932 Amar was at Deogarh where Benoy also came. They together went out for a walk. Benoy left the same night. Four days later Amar's eyes were affected, his face became crooked, his lips twisted and he could hardly speak. A doctor opined that the case was one of tetanus. Rani Suryabati wired to Benoy at Calcutta to bring the family physician. He brought Dr Tarunath instead. Rani Suryabati grumbled why no eminent physician was brought. Under the treatment of a local doctor, Amar gradually recovered. Benoy without being asked brought Dr Dhar from Calcutta who gave an injection which made Amar's condition worse. His condition became critical at night. Dr Dhar left the next day. Amar gradually recovered under the treatment of a local doctor, but Benoy again unasked brought Dr Dhar and Dr Sivapada from Calcutta for Amar's treatment. Amar was brought to Calcutta and recovered after a long time, the expenses of treatment amounting to Rs 15,000. A sinus appeared where Dr Dhar had given an injection. After this affair Amar contemplated a partition of the estate. Some time after Amar was brought to Calcutta by a wire sent in the Rani's name. While going back to Pakur with Suryabati at Howrah station Amar was given a pin prick by a person. He went away to Pakur but came back to Calcutta to

blood examined. When Rani was brought to Calcutta by a wire she found Amar lud up with fever and swollen arms. He was under the treatment of Dr. L. M. Banerjee and Dr. B. C. Roy but Amar died. Dr. Banerjee asked her to inform the police, but she did not as it might upset Amar.

Dr. Sivapada amongst others was charged with conspiracy to murder. The whole case could not be discussed here as the case of some of the accused is still pending in appeal before the Calcutta High Court.

The cross examination of some witnesses has been given in the chapter on cross examination. In addressing the Jury Mr. P. N. Banerjee, Advocate of Dr. Sivapada referred to the discussion that took place between Dr. Sivapada Bhattacharjee and Dr. Harihar Banerjee at the Medical Supply Concern about plague bacilli and said that in the course of the conversation both of them said that they did not know about the effect of the plague bacilli. Subsequently Dr. Sivapada told Dr. Harihar Banerjee that he came to know of it from the expert opinion gathered by the Police. The prosecution suggested that Dr. Sivapada became afraid when he heard about the arrest of Dr. Taranath and on the very day he heard of it he ran to the Medical Supply Concern and in course of making investigation he started this conversation with Dr. Harihar. Dr. Sivapada was a conspirator and he went to the Medical Supply Concern apprehending danger.

To meet that argument the defence Advocate said that he went to the Medical Supply Concern on the 18th of February and on the 19th February in the afternoon police collected expert opinion on the plague bacilli. It might be probable that Dr. Sivapada came to know of it and told this fact to Dr. Harihar in the course of the conversation that took place between him and Dr. Harihar on that day.

Mr. Banerjee next referred to the evidence of Rani Jotirmoyee who said that on the 11th of February Dr. Sivapada had been to her place for treating a patient. After examining the patient when Dr. Sivapada was leaving the place Rani Jotirmoyee asked him as to the cause of Amarindra's death and Sivapada told her that it was a pure case of murder although Dr. Sivapada said he did not tell anything to Rani Jotirmoyee. Mr. Banerjee said that it might be probable that Dr. Sivapada after coming to know that B. Pestis was found in the blood of Amarindra from the blood culture report he might have recalled in his mind the symptoms which he had noticed in Amarindra's system during the time he was lying ill.

Continuing Mr. Banerjee said that it was definite that up to that time B. Pestis was not detected in the blood of Amarindra. Dr. Sivapada was not aware that there was a single case of plague in Calcutta. Dr. Sivapada said the defence Advocate, was arrested on the 21st March and this story of B. Pestis came out through Rani Jotirmoyee. Collecting together all these circumstances Mr. Banerjee remarked that her evidence was not reliable.

Dr Sivapada in his statement said that he went to the Medical Supply Concern on the 18th of February and the Public Prosecutor said that it was very suspicious on the part of Dr Sivapada to go to the Medical Supply Concern and that clearly proved that he went there on receipt of the information of the arrest of Dr Taranath because he had apprehended danger.

Mr. Banerjee in his defence said that on the morning of that day he came to know through phone that Dr Taranath and Dr Dhar had been arrested in connection with Pukur Case. He also came to know that they were arrested in connection with the death of Amarendra Pande who was injected with plague bacilli. When he heard that story he must have recalled in his mind about giving a letter of introduction to Dr Taranath who said that he required it to go to Bombay. Dr Sivapada must have failed to recall in his mind whether he had given him any letter of introduction at all which was not at all unnatural for a busy doctor like him who had to attend multifarious business. It was very natural for an honest and innocent man to think like that although the prosecution made much about it. With a view to have light on the point Dr Sivapada went to the Medical Supply Concern to enquire about Dr Taranath. He was an honest man and that was the reason why he voluntarily told that fact to Dr Harihar Banerjee at the first instance he met him at the Medical Supply Concern. Dr Sivapada, said Mr Banerjee could easily keep it in secret if he was a conspirator and would not have gone there and voluntarily disclosed these facts to Dr Harihar Banerjee.

One of the questions that was put to Dr Harihar Banerjee was whether Dr. Taranath had gone to Central Province and Bombay. Was it the conduct of a co conspirator? Could that question come from a man who is alleged to be a conspirator? The answer would be no, never. On the other hand that showed that Dr Sivapada was out of touch with Dr Taranath for a long time. It was natural for an honest and innocent man to go to the Medical Supply Concern to enquire about Dr Taranath on the day he heard about his arrest. The above circumstances, said Mr Banerjee conclusively proved that his client was not guilty of conspiracy.

Proceeding the defence Advocate said that the Public Prosecutor suggested in his argument that Dr Taranath going on the 13th November to the house of Dr Sivapada at midnight proved that Dr Sivapada was in conspiracy with Dr Taranath. Public Prosecutor in support of his argument said if he was not a conspirator why Dr Sivapada allowed this man going to his house so late at night?

To meet that suggestion made by the prosecution Mr Banerjee said that Dr Harihar Banerjee in his evidence said that Dr Sivapada told him that on the day as mentioned by the prosecution Dr Taranath came to his house in connection with his wife's illness but he did not come down to meet him as he was tired and indisposed. If Dr Sivapada knew that

he was a conspirator he would not have told this fact to Dr Harihar Banerjee. This disclosure before Dr Harihar Banerjee clearly proved that his client was not a conspirator.

If Dr Sivapada was in conspiracy to kill Amar Pandey he would naturally know that Amar was infected with plague bacilli at the Howrah Station. Certainly he would have known from what Amarendra was suffering. If he was a conspirator certainly he would not have disclosed these facts to Dr Harihar Banerjee and others to risk danger. On the other hand he would have kept everything in secret for his safety.

Proceeding, Mr Banerjee said that another circumstance in favour of Dr Sivapada was that when he went to see Amar at his death bed he did not take any precaution for his own safety. It was alleged that he was in the conspiracy. If so, he must have known that Amar was suffering from plague. He not only took any precaution but, according to evidence even sat on Amar's bed. He must have known that it was a very risky thing. All this showed that he did not know that it was plague. No doctors did.

The evidence further was that Dr Sivapada was an M. D., a professor of the Tropical School, an eminent doctor having an extensive practice and a house in Calcutta. Considering his status, education, culture and position in society, was it likely that he would risk his fair name and reputation by entering into a conspiracy to kill Amar against whom he had no grudge? What was the price paid? There was no evidence that any cheque or money had been paid to him nor was there any evidence that about that time Dr Sivapada had deposited a big amount in the bank. Even if it was assumed that every man had its price a good part of the Fakur Haj estate was necessary to buy up a man of the position of Dr Sivapada. It was an astounding proposition.

Mr Banerjee next submitted that if there was a conspiracy, there must have been association between him and others during the period of conspiracy. In May 1932, it was said that Dr Tarasath made frantic efforts to get plague culture from the Hasbaine Institute of Bombay. Later, Dr Ukil brought a tube of plague culture for him. About a year later, this Dr Ukil also gave him a certificate although he denied it in lower court. If he had admitted it, Dr Sivapada would have been saved from the worry and anxiety of this trial because the erroneous belief that it was he who gave the letter which Benoy carried to Bombay was responsible for his arrest.

Dr Tarasath was himself a bacteriologist and he had the help of such an eminent bacteriologist as Dr Ukil. Where then was the necessity for Dr Tarasath to consult Dr Sivapada about the virtues of plague bacilli? Where was the evidence to show that Benoy approached him for learning the virtues of different culture? There was no evidence to support the allegation that his was the skilled brain which played the part in the conspiracy by selecting the plague culture as other kinds of bacteria would not

do. That was the early part of the conspiracy. The second stage was the Droghda visit. What did he do there? Would he do and say things which would save the victim of his alleged co-conspirators? Was that the way in which he helped his co-conspirators?

The third stage was the certificate which he gave to Dr Taranath. The prosecution might argue with some reason if that letter had been carried by Benoy to Bombay. But there was no evidence that Dr Sivapada's letter had ever been used which only showed that it was a worthless letter not fit to be used. If they were in conspiracy would Dr. Sivapada give such a colourless letter or would they accept such a letter? It only proved that there was no conspiracy.

What took place on December 2, when Dr Sivapada went to see Amar and the subsequent events were isolated acts having no connection with the conspiracy. It was by the merest chance that Dr Sivapada was summoned to Amar's death bed. It was again pure accident that Amar's relatives went to him for a death certificate. They might as well have gone to Dr G S Chatterjee for it. There was also no evidence that the conspirators manoeuvred in such a way as to leave no option for Amar's relatives but to call him.

What did Dr Sivapada do when he went there, asked Mr Banerjee. The first thing he suggested was that blood should be examined. He was told that blood had already been taken by Dr Gupta for examination. If he was conspirator, he would not have made such a suggestion. Because he would be the first person to avoid it, lest it would reveal the presence of plague bacilli which, as a conspirator, he must have known, would be found in Amar's blood. There was also no evidence that, knowing that the blood had been taken for examination, he tried to influence Dr Gupta who was a junior in the same school in which he was a professor. Dr Gupta said that Dr Sivapada never saw him in December. Nor was there any evidence that he tried to tamper with the unlocked incubator in the school in which Amar's blood had been preserved. Piercing together all these circumstances and having regard to the fact that he never tried to see Dr Gupta, the inference was irresistible that Dr Sivapada was never in the conspiracy.

It was also significant that on March 6 last Dr Sivapada was not arrested although the police had all the facts before them. They knew that Dr Sivapada had given the death certificate and had failed to inform the police. These facts were not sufficient. On March 6, he admitted that he gave a letter to Dr Taranath. He was not conscious what trouble he was bringing upon himself by making this admission. The police at once came to the conclusion that this was the letter which had been carried by Benoy. And therefore Dr Sivapada had helped them in the conspiracy. He was arrested. In the lower court, Dr. Ukil said that he did not give any letter to Dr Taranath. Dr Naidu

could not remember who was the author of the letter brought to him. He remembered that it was an eminent Calcutta doctor who was attached to an institute. That exactly fitted in with the description of Dr. Sivapada and he was arrested. In the Sessions Court, Dr. Datta remembered that it was his professional friend Dr. Ukil who gave that letter. Dr. Taranath also admitted that Dr. Ukil gave him that letter. Thus was a bomb-shell to the prosecution case. And next they came with the explanation that Dr. Sivapada must have been bribed to give the death certificate. There was not a tittle of evidence to support this belated explanation of the Crown.

In order to come to the conclusion that Dr. Sivapada had caused the disappearance of the evidence of murder and had omitted to inform the police, the jury would consider what was the material before Dr. Sivapada at the time he gave the death certificate. There was only a vague surmise of Amar who said that he felt a pin-prick. None of the doctors who attended Amar, did believe the story. Even his relatives did not believe it as would be apparent from the fact that they asked for the death certificate. If Dr. Sivapada along with other doctors did not believe in the story, he did nothing wrong. Even when some of the doctors came to know that plague had been found in the blood, they did not inform the police. Each of the doctors saw and heard what Dr. Sivapada saw and heard.

Rabi now said that he was overwhelmed with grief and so he did not inform the police. However much he said now, that was no reason why he could not inform the authorities. In every murder case, the relatives felt grieved. But they did inform the police all the same. If he believed in the story, why did he send for a death certificate? His conduct showed that he himself did not believe the story.

Mr. Banerjee in the course of his address said that towards the conclusion of the prosecution address that what Dr. Sivapada heard and saw, he had reason to believe that it was a case of murder and there was sufficient evidence showing that the death of Amarabha was caused by murder.

With regard to the first item, said Mr. Banerjee that he would draw the attention of the Jurors to the three distinct reports he had received. He had issued the certificate. Palindra Pandey, one of the important members of the family, said that nothing had been found in the culture. Then he was requested by Prakash Mishra to give a death certificate and those reports came to him before he issued the death certificate.

With regard to the report of Lalindra Pandey, said Mr. Banerjee that Palindra himself said in his evidence that Santosh Kumar Gupta who had taken the blood culture, was a quack about the result. He said in his evidence that he was

told by Dr Santosh Kumar Gupta that no growth was showing in the blood culture. Then again Captain Chatterjee who proved in his evidence that Rabindra told him that nothing was found in the blood.

In that connection he said Rabindra Pandey was re-examined by the prosecution and Rabindra in re-examination stated that no poison was found in blood.

Proceeding the defence Advocate stated that from evidence on record there was clear proof that in the case of ordinary diseases such as malaria influenza typhoid etc if the blood was taken for culture growth was visible between 48 and 72 hours. Dr Santosh Gupta also said that in case of malaria they could give the report then and there. In case of typhoid it takes about three days but influenza takes a long time because it was a slow going germ.

Dr Sivapada grew suspicious no doubt when the pin prick incident at Howrah Station was reported to him and as a doctor he was looking forward for the result of the blood culture. He was very much anxious for the blood culture report because he thought the blood culture report would help him in treating the patient. So Dr Sivapada was expecting that the blood of Amarendra would show some growth between 48 and 72 hours before he had heard the result of the blood culture.

Exactly after the lapse of 72 hours Rabindra Pandey gave Dr Sivapada the report saying nothing was found in the blood.

Dr Sivapada was satisfied because he thought that the blood has been cultured by an expert hand and from such a big institution and therefore naturally concluded that it was the final report.

He naturally came to the conclusion that Rabindra Pandey who was taking so much interest in Amarendra's welfare must have given him a correct report and therefore he had no hesitation in giving the death certificate.

He saw the symptoms of plague but still he could not conceive the idea of plague on the face of the blood culture report as he had heard from Rabindra Pandey.

Under these circumstances it could not be said that Dr Sivapada had reason to believe that the death was caused by m order.

Mr Bhanjoo said that the first circumstance which went greatly in favour of Dr Sivapada was that on December 4 Benoy went to Dr Aswini and asked him about the name and address of the doctor who had taken the blood of Amar and if anything was found in the blood. These were the things which were already known to Dr Sivapada. If they were in the conspiracy Benoy might have known these things from Dr Sivapada. The very fact that Benoy went to enquire about these things showed that he was unaware of these details. That conclusively proved that Sivapada was not in the conspiracy.

The supreme question for the Jury was whether Dr Sivapada was in the conspiracy. The evidence showed that there was not the remotest likelihood of his being in the conspiracy. If he was not a conspirator, what was his motive in suppressing the information from the police? For whose benefit would he do it? Why should he perversely disbelieve the story of the pin prick? If he disbelieved it, it must be for other reasons. It was not in this court that he for the first time said that he suspected no foul play. On February 13, when he was a free man and there was no talk of his arrest he told the police about it. It could not therefore be said that it was a belated defence.

Concluding Mr Banerjee said 'Can you lay your hands on your breast and say with satisfied judgment and clear conscience that Justice demands of you to say that the charges against Dr Sivapada have been proved? Remember that before you make up your minds against my client on any of the charges. Remember that before you brand this healer of men as a killer. Remember that before you make a clean sweep of a brilliant career like his. Remember that also before you deprive the community of his humane services, before you deprive parents of their son, wife or her husband and children of their father and finally before you knock him down from the sacred and exalted chair of the teacher. You must be conclusively satisfied beyond all shade of reasonable doubt that you are not setting up a dangerous precedent by convicting on any nothing.

"Remember gentlemen," said Mr Banerjee, "that your supreme duty is to rise above the prevailing atmosphere of prejudice, suspicion and sensation because once your verdict has gone forth there is no going back upon or rectifying it however much you may regret or repent later. Remember that suspicion never supplies positive evidence nor do presumptions supply legal proof.

'If you remember this while deliberating in your retiring chamber, you can come to but one verdict regarding my client and that is one of not guilty. And because I believe that, I feel that the longer I speak to you the better are the chances of my convincing you of his innocence.

I am deeply conscious of a personal interest in your verdict for if it were an unfavourable verdict, I could attribute it to no other cause than my own inability to conduct the defence and I feel persuaded that if it were so the recollection of this case will haunt me as a dismal and blighting spectre to the end of my life.

'Dr Sivapada Bhattacharya is innocent. May his judges declare it in no uncertain terms so that he may leave the court without stain on his character. This is my earnest appeal to you. May it find a response in your hearts."

The jury returned an unanimous verdict of not guilty so far as Dr Sivapada was concerned. Dr Sivapada was acquitted.

CASE AGAINST MR N R SARKAR

Full Text Of Hon ble S K Sinha's Judgment

Following is the text of the judgment of the Hon ble S K Sinha in the case against Mr Nalin Ranjan Sarkar —

The principal characters in this case of alleged adultery are Pramatha Nath Sircar, aged 36 a Brahmo by persuasion and a professor of Economics on a salary of Rs 110/- per month in the first grade College at Feni in the district of Noakhali, his wife Bina now aged 24, a graduate of the Calcutta University, daughter of Bibu Nagendra Kishore Biswas a clerk in the office of the Director of Land Records, Alipore residing at 1 Dr Bhabendra Road, Bhowanipur, the accused Nalin Ranjan Sarkar aged 56, Mayor of Calcutta and the head of the Hindustan Insurance Co a widower, without children, living alone on the top floor of the Hindustan Buildings he is the first cousin of Bina's father Nagendra Biswas, their mothers being sisters, Bina calls him Bara Kaka, amongst Bengalis the relationship is reckoned as that of uncle and niece but really nothing more than that of second cousins, there would have been no bar to their marriage under the Civil Marriage Act 1873. The complainant Pramatha Nath Sarkar and Bina Biswas were married under the Civil Marriage Act on October 4 1929 in the Brahmo Samaj prayer Hall at Bhowanipore

Story of the Case

The present case was instituted in the husband's complaint on February 20, 1935 some eight months after he discovered them in the act of adultery on June 17, 1934 in the accused's residence in the Hindustan Buildings. This unusual delay in coming to Court will need further consideration in due course. The principal allegations made in the petition of complaint must be set out here for comparison with the facts appearing in evidence. At the time of the marriage Bina, then aged 19 was a student in the second year class of the Diocessan College Calcutta. The complainant says he agreed that even after marriage she should continue to live with her parents in Calcutta and proceed with her studies, that she passed the Intermediate Arts Examint on in 1930, while he would have to go to Feni. Immediately after the wedding he took her to his family house at Krishnagar where his mother and sisters live. She stayed there for a week, occupying the same bed room but there was no consummation of the marriage, on account of her objection. She returned to Calcutta and after staying on for a month at Krishnagar till the end of the Pujah vacation he returned to his duties at the Feni College. On several occasions he came to Calcutta and put up at his wife's parents' house but she was always cold and indifferent and there was no inter course. The accused was a regular and regular visitor to the house, Bina was always very attentive and often used to go out in his motor car, on enquiry he learned that

used to visit his flat. About six months after the marriage, in April or May 1930, a professor in the Feni College gave him a book called *The Recollections of Romesh Dutt* (an obscene book, the publishers of which were prosecuted and sentenced to imprisonment in 1931), there was some reference in it to the accused's character and this first roused his suspicions regarding his wife's relationship with the accused. As she continued to refuse him his marital rights, he questioned her as to whether her affections were elsewhere; she refused to reply. On another occasion, when pressed again she agreed to perform her wifely duties provided he used contraceptive means; this made him still more suspicious and he asked how she came to have any knowledge of such things, her reply was—"from friends," without disclosing any names. Towards the end of 1930 her parents wrote to him at Feni that Binu was in indifferent health and required a change, she might be sent to Kishoreganj (Nymensnigh) to stay with her uncle Dchendra Kishore Biswas and his family, to which suggestion he agreed. Instead of going there, however, she went off alone with the accused to Delhi in January 1931, without her husband's knowledge or consent and spent three months there with the accused living alone with him in a house rented by him and at his expense, they returned to Calcutta together on 14.4.1931 travelling in the same compartment, marked reserved for Mr and Mrs N. R. Sircar.

Husband's Suspicion

The complainant came to Calcutta from Feni when his college closed for the summer vacation in April, after staying at No. 1, Dr Rajendra Road for a few days, he took his wife to Krishnagar. She still refused to be a wife to him, he says he noticed physical changes in her, though he had never had intercourse with her and he sensed something wrong. One evening he forced her to have intercourse and found she was not a virgin. On being questioned, she refused to reply and became angry, on his persisting and demanding an explanation, she admitted that at Delhi she had slept with the accused. He however, forgave her. When he returned to Feni at the end of the summer vacation of 1931 she refused to go with him and against his wishes returned to stay with her parents in Calcutta and began her studies for the B. A. having passed her I. A. in June or July. Shortly after that, he stopped sending her money to pay her College fees which he alleges, were paid by the accused. In the summer of 1932 she took her degree, as a result of his protests to her parents, she agreed to join him at Feni. On her arrival, he says he noticed certain physical changes in her which led him to suspect that she was pregnant and he arranged that they should occupy different bed rooms. After two or three months his suspicions were confirmed on his taxing her she fell at his feet and with tears in her eyes admitted that her Bara

Kaka was responsible for her condition that he had also debauched her two young sisters and his own younger brother's wife except that with them he had used contraceptives whereas with her he had taken no such precautions she begged for forgiveness and besought him not to publish her shame on promise of being a faithful wife in future he forgave her and consented to treat the child as his own. The child was born at the Chittaranjan Sara Sahai Hospital in Calcutta on 13.8.1933 the accused reserved a room for her and paid the confinement expenses.

Hindusthan Building Incident

While the complainant was on a holiday in Calcutta during the summer vacation of 1931 in acquaintance Benok Bhan Biswas went to him one evening and asked for an introduction to the accused with a view to securing the agency of the Hindusthan Insurance Co. for the district of Nalga, his home being in that district. The complainant agreed and on 17.6.34 he took him to the accused's flat in the Hindusthan Buildings, on entering the accused's bedroom he found, to his horror, his wife and the accused lying naked in bed in each other's arm the accused went into the bathroom and closed the door his wife got furious and ordered him to go out of the room he thought it useless to protest in view of her attitude and he and Benok Biswas left the place. He consulted his brother-in-law Bibhuti Bhushan Sircar who however advised him to do nothing hastily and returned to Feni at the end of the summer vacation, on June 30th. He next came to Calcutta during the Pujas and as the result of another family conference he inserted a notice in the Statesman in October to the effect that his wife having left his protection, he was no longer responsible for her debts. He also wrote a registered letter to his wife which was refused and returned to him. On February 22nd 1934 he came to Calcutta to attend an Examiners meeting His brother-in-law Bibhuti showed him an article entitled "After 17 years' in the 'Kheal' of February 7, in which his wife's name was coupled with accused's in no flattering terms and advised him to take proper action, as the matter had become a public scandal. The complainant says that he went to a certain firm of Solicitors with a view to instituting divorce proceedings their advice, however was to bring a criminal case against the accused and the complainant allowed himself to be guided by them. At the time of presenting the complaint, he produced some 20 letters written by his wife to him, one of them, from Delhi, was to the effect that she was sleeping on the verandah with Bari Kaka. The complainant's lawyer also undertook to prove from the Railway records that accused and Bina Sircar travelled together from Delhi to Calcutta on April 14 or 15, 1931 in a compartment marked reserved for Mr and Mrs N. R. Sircar also from the records of the Chittaranjan Hospital that the accused engaged a room there and paid for Bari Sircar's confinement.

Application was also made for search of accused's flat and Bina's room in her parent's house for letter and her papers. No warrant was taken out for search of the accused's house. In Bina's room, on search by the police was found her private diary. The hospital sent certain registers and bed head tickets which did not bear out complainant's allegations and have not been tendered in evidence. The Railway authorities wrote that the records of reservation in 1931 had been destroyed under the rules. On these allegations process was issued against the accused to answer a charge of a conspiracy. The oral evidence in the case is that of the complainant himself his wife who was summoned as a court witness, Badinazaman a motor driver of the late Raja Bhoj Singh Dudhoria who deposes to intimacy between accused and Bina Sarkar at Delhi. Mr Shamsuddin Ahmad an Advocate of the Calcutta High Court and elected Councillor of the Calcutta Corporation, who proves Bina's residence in accused's house at Delhi. Benode Behari Biswas, brother in law of the complainant who is said to have accompanied him to the accused's residence on June 1st 1934 and seen the accused and Bina Sarkar in a compromising position. Bibhuti Bhushan Sarkar another brother in law of the complainant who acted as his friend guide and philosopher and at whose instance complainant decided to take legal action against his wife and the accused, and Bimalendu son of Bibhuti who is said to have kept a watch on Bina Sarkar's movements from October 1933. There is in addition documentary evidence relevant to the issue in the shape of Bina's letters to her husband which he has produced she having waived her statutory privilege under the provisions of Sec 122 Evidence Act. There is also available Bina's personal diary which was found in her room in her parents' house was searched by the police at the instance of the complainant. Finally there are complainant's letters to his wife. A word of explanation is necessary to show how they came to be produced in this case. Bina says that she made them over to her father in October 1934, after her husband issued that notice in the 'Statesman' with a view to taking legal advice—her father made them over to a lawyer. They have been produced in this court from the custody of the accused. How he came to be in possession of them is not explained. Bina is unable to offer any explanation. It is I think reasonably obvious that either Bina or her father made them over to the accused for the purposes of his defence. The matter might not have been worth mentioning if it were not far from the fact that these letters were the cause of quarrel in June 1934—according to the complainant on June 14 but according to his wife on June 23—which led to the final rupture between them. Complainant says that he came to Calcutta on or about June 11 and put up at 1, Dr. Rajendra Road, there was a quarrel two or three days later and his wife ordered him to leave the house. The occasion of the quarrel is tolerably clear, he says he was reading his wife's personal diary and her letters when she

came in, flew into a rage and told him to clear out. Her version is slightly different, in her absence her husband abstracted from her box his letters to her and put them in his own box she took them back hence the quarrel. She admits having told him he could clear out. It is therefore obvious that she set great store by her husband's letters to her. Extending over a period of 4 years from 1929 to 1934 she could not have set so great a value on them because of her affection for her husband not because of the tender sentiments expressed in them for the passages in her diaries which will be quoted at some length presently show conclusively that within the first year of her married life she expressed the most unwisely sentiments towards her husband her reflections as recorded in her diary show that she regarded her husband with great disfavour and distaste and the marriage as a great failure and herself as a most unfortunate woman. Another of her reflections also noted in her diary, as far back as 1930 relates to the vital necessity of her continuing with her studies and qualifying herself to earn her own living if the occasion and necessity should arise. It has therefore no sentimental value attaching to her husband's letters that led to the furious quarrel in June 1934 when she found he had taken them from her box in her room.

Magistrate's unenviable Task

I find myself in the unfortunate position of having to act as the biographer of the married life, such as it was of the professor and his wife. Although the principal incidents on which complainant relies to prove his charge of adultery are three viz., his wife's visit to Delhi alone with the accused, the birth of a male child to her on August 13, 1933 and the incident of June 17, 1934 at the accused's residence, it becomes necessary to consider the circumstances, under which each of those events occurred and that entails a review of the whole of their married life extending from October 1929 to June 1934.

The complainant first met Bina Biswas in the house of a certain gentleman in Calcutta in April 1929 and the marriage was arranged by a daughter of the gentleman, the proposal was first made by the girl's parents and the complainant expressed his readiness through that lady; he proposed to Bina herself in May and for her acceptance there was a formal engagement in that month. In July or August she changed her mind and wished to break off the engagement, she gives no particular reason for that desire but says she did not approve of his attitude in certain matters which she has not specified. She says the complainant reasoned with her and talked her round and she withdrew her objections. The marriage took place at Bhowampore, under the Civil Marriage Act on October 4, 1929. She denies her husband's allegations that the marriage has not duly consummated and declares that she was a virgin, in the full sense of the word, from the beginning. He person

however discloses her real sentiments about marriage in general and her own married life in particular. I shall quote four passages from her diary to illustrate the point —

(i) Entry of 14-4-1930 — 'To all appearance I am a married woman. They say that marriage brings about a complete change in human nature. In myself I find not the least change. There is no love in my heart, my life is a failure. I realise that all human desires are not capable of fulfilment. I had so many hopes and aspirations, all are now gone. My soul is desolate. I am full of regret that I could not make one other human being happy, all his life he will be haunted by regret that marriage brought him no happiness. What shall I do? To make him happy means a great loss to me. It is I who am to blame. I should have refused to marry him.'

(ii) 18-9-1930 — Our College closes on Friday. We get a month's holiday for the Pujahs. Must I go to 'that' Krishnagar again?

(iii) 24-9-1930 — I have often mused of my husband and his home but it is not a picture of happiness and there is no hope. I felt how dreary my life is. Yet I have affection, kindness, love, womanhood in me. I have them all. But there is no one to bestow them on. By marriage I gained nothing and lost much.

(iv) 25-10-1930 — I often wonder why God inflicted such a marriage on me. I felt no attraction to my husband. I thought it would come after marriage but the opposite is happening.

Unhappy Married Woman

Clearly this is the diary of an unhappily married young woman. The cause of her regret and unhappiness is not clear. When questioned on the point she described two reasons which appear to me to be wholly inadequate on view of the very strong feelings she expressed in her diary. These reasons given are (1) her husband's unwillingness that she should continue her studies in Calcutta, (2) the unkind treatment she received in her husband's house at the hands of his mother and sisters. Her husband does indeed state in evidence that after passing her B.A. Examination in June or July 1930 he did not desire her to go on with her studies but wanted her to go and live with him at Feni. There are however several letters of his which show the contrary, they show that he was quite willing that she would live with her parents and study for the B.A. As for his mother's unkindness to her, her own diary shows it is not true. On one occasion she did note in her diary that in her husband's home she always felt rather a stranger though her mother-in-law was very attentive to her comforts. This does not prove unkindness to her. Her feeling of not belonging to her husband's home might have been due to something lacking in her. The complainant now of course declares that she was all along unwilling to leave Calcutta because of her attach-

ment to the accused. On the evidence I find myself unable to state with any degree of certainty the cause of her unhappiness and I do not prefer to offer any opinion on the subject. But the fact remains that in the course of her married life she went to that hateful Kri-hnagar three or four times and to Loni only once. That she was unhappy and dissatisfied with her marriage which she regarded as a hollow sham and mockery is clear but that does not in itself prove that she was an unfaithful wife or in particular that she was unfaithful to her husband for the accused. Her husband says in evidence in chief that he began to suspect his wife in April or May 1930 when he read 'Recollections of Ramesh Dada' but in cross examination he says he did not suspect her in 1930 but later. That it could not have been so early as April or May 1930 will be evident from the fact that that obscene book was not published till September 1930, as appears from the Government Gazette of book publications. Then there is his letter to his father in law (Ex I dated 1-10-30) requesting him to approach the accused with a view to securing him a good job in the accused's own firm or some other insurance company, on the ground that it would suit him to live in Calcutta and Bina could go on with her studies. There is another earlier letter of his to his wife (Ex Q dated 11-7-1930), advising her not only to get admitted into the Diocesan College (she had by then passed her I A) but also giving her advice as to the subjects she should select. On 13-10-1930 he wrote to his father in law— "When Bina is so keen on studying for the B A in College I would not in spite of my own inconvenience stand in the way. So when she wants to join college, let her do so." These letters written by the husband to Bina (which she prized so much, clearly show that not only did he consent to her going on reading for her degree which necessarily meant her staying in Calcutta with her parents, but that he was ever asking a favour of the accused. It is obvious that either he did not suspect the accused at the time or if he did he was conniving at things. His conduct was not that of a suspicious husband. There was not a word of warning from him to his wife or to her parents not a threat to the accused who was admittedly a frequent visitor to the house.

Chronological Events

We come now in the chronological order of events, to the first definite incident when adultery is alleged to have been committed not on a single occasion but over a period extending to three months. It is an admitted fact that on January 26, 1931, Bina Sarkar left Calcutta alone with the accused, unaccompanied by any relation of either of them, for Delhi, that the accused rented a house there and Bina stayed in the house till April 14 or 15 when they returned to Calcutta. Let us consider the why and the wherefore of this trip to Delhi. So far as the accused is concerned, the matter is simple to determine, in his written statement he says he had to go to Delhi with his staff in connection with the work of the

Banking Enquiry Committee, of which he was a member, Bina had been suffering from fever for several months from the middle of September 1930 and a change of climate was considered essential. As neither her parents nor her husband had been able to arrange for the change, she accompanied him to Delhi at the suggestion of Dr. Sisir Kumar Mitter (P. W. 3) of the Science College, Calcutta, whose wife Lily stands in exactly the same degree of relationship to the accused as Bina viz. niece of second cousin, call it what one will. Bina's evidence is that she was desperately ill at the time and her father despaired of her life, she herself thought the end was not far distant and it was her brother in law Dr. Sisir Mitter who put forward the suggestion that she take the opportunity of going to Delhi with her Barakaka to recoup her health. There is however, an entry made by Bina herself, in her private diary, on 29.1.1931 (in which date shows it was made after her arrival at Delhi) which shows that neither Bina, nor her brother in law nor her Barakaka has told the truth. The entry runs as follows, — My kaka suggested I should accompany him to Delhi. I laughed and said 'I have been to Switzerland in imagination, only Delhi remains (I take this to be meant as a brilliantly witty sally meaning that she thought she had about as much chance of going to Delhi as to Switzerland). One day Sisir Dula Babu came and said, I hear Barakaka will rent a house in Delhi for his stay there. Why not go with him and recoup your health?' Two or three days later I said to kaka Take me with you to Delhi. Speak to my father and write a letter to Feni (referring to her husband). That very day kaka spoke to father who said he had no objection but was afraid Promotha might object. Nothing can be clearer, therefore, from this entry in her diary than the fact that it was the accused who first put into her head of her accompanying him to Delhi, that she accepted the idea with alacrity and followed it up with energy, not without anticipation of some objection on the part of her husband earning his livelihood at distant Feni. That she was not in good health at the time will appear from the following letters written by him to her and to her father —

(1) Letter of 13.10.1930 (Ex D) to his father in law 'Please let me know about Bina's health.'

(2) Letter of 11.10.1931 (Ex F) to his father in law — 'I received both your postcards today. On hearing of Bina's state of health I am particularly anxious and sorry. Under the circumstances, it is better for her not to come here (Krisbnagar) where there is no good doctor. Consult a good doctor and do as he advises. You have written about a change. I have absolutely no objection. If she recoups her health I have no objection even to her attending College.'

(3) Letter of 19.10.30 (Ex T) also to his father in law — 'I am glad to hear Bina has got rid of her fever. She is constitutionally weak and her health is not good.'

Letter to his wife, dated 5.11.30 (Ex 6) from Feni 'I arrived here yesterday. I am missing you sadly. You will not get well if you remain depressed. Everyone is wishing an immediate change for you.'

(3) Letter to his wife dated 19.12.30 (Ex K) 'advising her not to attend College to the detriment of her health.'

The complainant has stated in Court that as he was not in Calcutta at the time he cannot say whether she was really ill or how ill she was. His case is that her illness was only a pretext to avoid going to him at Krishnagar and Feni and an excuse to go off to Delhi with the accused. Assuming that she was really in need of a change the next question that arises is whether she went to Delhi with her husband's knowledge and consent. She maintains it was and he denies it. Before the idea of going to Delhi was put into her head by the accused as her own diary proves it was, there was some talk of her going to Kashoregunj. Mymensingh to stay in the family of her uncle Debendra Kashore Biswas, there was some idea of her going to another uncle at Moulmein. In evidence in this Court Buva has stated that she could not go to Kashoregunj because her aunt came to Calcutta and the defence triumphantly referred to her letter to her husband to that effect dated 14.11.1930 (Ex O/P). For her real feelings on the subject we must again turn to her private diary which shows something very different to what she wrote to her husband—entry of 14.11.1930 (Ex 119)—There was a proposal for going for a change of climate as I was getting fever. Father suggested Kashoregunj. Other family members are not willing to go there any more than I am when father asked me. I said no. Her feeling towards her husband at this time are very clearly reflected in her private diary. On 9.11.30 she wrote therein her husband came to Calcutta on November 1 and left for Feni on November 4 when he first came she felt very well. He sent for her and enquired of her illness. She replied to all his queries without so much as looking at his face. On 11.11.30 she wrote down further reactions on the marriage ties marriage without love is but a blind ties and a pollution of one's body. There is an entry of the previous month (11.10.1930) which will also throw some light on her movements and her attitude generally. The note is entitled 'Peculiarities of Baares' and reads thus—At the time of my starting father was not at home. So I could not speak to him. There was another reason for not informing him. He would never have consented if I had sought his permission. I boarded a bus hesitatingly. I thought father would scold me when he returns home. But soon that sense of timidity wore off. A line of my song flashed through my mind—In the wilderness of this world whom need I fear? A great joy came into my mind whom need I fear? What can any man do? At most they can lure abuse at me. There is evidence to show when she went to Benares with whom and why. It is clear that it was a clandestine visit unknown to her father or her husband. She has

in evidence that she went to Benares with her mother. Her own diary proves it to be false.

Delhi Incident

It appears, therefore, that her bodily well being, no less than her spiritual uplift and the clearing of her fog of depression, rendered it absolutely essential that she should go to Delhi with her Bura kaka. Was it with her husband's knowledge and consent? He says that his permission was never sought. On 23.1.1931 his wife wrote to him (Ex H) as follows — Bura Kaka is going to Delhi. He has asked me to go with him as it would be a good change for me. I may go with Bura kaka. We will probably be leaving tomorrow, i.e., Monday, by the Delhi Express in the afternoon. By no stretch of imagination can this be regarded as a dutiful and obedient wife obtaining her husband's permission. It announces the probability of her going. It announces an accomplished fact in the sense that it was impossible for her husband to stop it even if he had a mind to do so, she says she is likely to start the next day. Her diary, however, shows she did not actually start till January 26 but how was her husband to know that when he got her letter on January 26 saying she was off that very day. From the complainant it was elicited in cross examination that he sent a telegram giving his consent to her going to Delhi but he says he was given to understand by his father-in-law in a letter that Bura's younger sister and the accused's niece and Bura's mother would all be going with her and the accused to Delhi. The defence contends that he should not be believed because he has not produced that letter of his father-in-law which he says he has destroyed. It might equally be contended that as the defence has not produced the telegram they have something to conceal and the telegram if produced might disclose something relevant as to complainant's idea of who were going to Delhi and on what conditions he gave his consent.

We must turn once more to her diary to see whether she was going to Delhi as an invalid who was desperately ill or whether she regarded it as a very jolly outing. On 29.1.1931 she wrote in her diary as follows —

We started for Delhi by the Punjab Mail on the 26th night. I had a comfortable journey in a 2nd class compartment. Kaka occupied 1st class. I spent the night lying down. I went to Kaka's compartment in the morning and had tea with him. I had chop cutlet andesh loochi etc. At mid-day I had curry and rice and dal, vegetables etc. At 3.30 p.m. I had tea, fried chura, singara etc. Kaka proposed we should have dinner in the restaurant car. At 7.30 p.m. Kaka called and said 'Let us go to dinner.' I felt very happy before I started for Delhi. I am here alone but none the worse for it. The diet described above even if we leave the numerous et cetera to the imagination, is hardly that of a moribund invalid whose life was despaired of.

The situation is really extraordinary. A young woman aged 20 or 21 goes off alone with an elderly man aged 51 or 52, whom she no doubt calls Bara kaka but who is not so very closely related to her. The only intimation she vouchsafes her husband is that very likely she is going and that on the very next day. That is hardly seeking his permission or even ascertaining his wishes in the matter, much less is it giving him time to say anything one way or the other. Assuming that her father did write and tell Promotha that other women folk of his family would go with her, it is offset by her own note in her diary that she wanted her father to write to her husband and that she anticipated objection on his part. There is the further point to be considered that if complainant was given the assurance that Bina would not go alone why was it that she did not go alone? Her answer is short and concise—no one was available. One wonders whether all her sisters apparently she has at least two, if not three—were all busy studying for their I A and B A like their elder sister. If her mother could go with her to Benares why could she not go with her desperately sick daughter to Delhi? Under these circumstances it must not be regarded as unduly uncharitable if people are so low minded as to regard the conduct of the accused and Bina as not wholly above suspicion.

It is in evidence that the husband and wife corresponded with each other while she was at Delhi and on two occasions on 22/2/31 (Ex 16) and 11/4/31 even the accused wrote from Delhi to the complainant. In the first of these two letters the accused even invited the complainant to take casual leave and pay them a visit which offer however he did not avail himself of. The complainant swears that as soon as he got his wife's letter and realised she was there alone with the accused he remonstrated. When shown his letters carefully treasured by his wife (they do not contain any word of remonstrance or protest) he said he thought it useless for him to protest as he was faced with an accomplished fact. On the one hand I feel that safely tucked away as he was at Feroz and dealing with a wife such as this it is likely appears to be from her own diary, he must have found himself in an extraordinary difficult position. She went off without his permission. Can it be with any degree of certainty that she would meekly have returned to Calcutta if he had ordered her to do so? On the other hand this extraordinary man's subsequent conduct is most difficult to understand. On Bina's return to Calcutta on the 14th or 16th April 1931 he went and stayed at her parents' house for a few days and then took her to Krishnagar where she stayed with him for six weeks. He then brought her back to her parents' house and left her in Calcutta to resume her studies. Admittedly he never uttered a word of warning to anyone. If he did suspect his wife's fidelity it would not have been without reason or justification. One cannot help wondering what Dr. Sir Mitter whose

as he says stands in the same degree of relationship to the accused as does Bina and gives the accused a very good character as an affectionate uncle would have done in similar circumstances if his wife Mrs Lily Mitter had thought fit to go off alone with the accused to Delhi and spend three months there with him. There are certain other facts which also go to render the complainant's conduct very curious. In a letter written to his wife from Feroz on 17/7/31, he informs her he has applied for a post which fell vacant in the Delhi College to which his wife replies on 28/7/31 that Bara Kaka has asked Humud Sinker (? Roy) to write to the Principal of the Hindu College. On 27/11/31 he writes to his wife (Ex P) that after living together so long he is finding single life very distasteful. All I can say is that I simply do not know what to think.

Before leaving this Delhi incident reference must be made to the evidence of the witnesses Mr Shamsuddin Ahmad and Badiuz Zaman. The former only proves Bina's presence in accused's house a fact which is not in dispute. Badiuz Zaman however, seems to prove adultery. He is a motor driver aged 30 who was in the service of the late Raja of Azimganj who was a member of the Council of State. He accompanied his master to Delhi in the first week of February 1931 when the Council of State was in session. The house occupied by the accused is in the same compound as the Raja's separated by an extensive lawn. Badiuz Zaman says he used to see Bina and the accused talking and sitting in their house—in his own quaint language he used to see her feeding him with bread and biscuits. On one occasion he saw them in bed in each other's arms. His evidence however is worthless for two reasons (1) its inherent absurdity, (2) the manner in which it was secured. He admits that the two houses were separated by a vast expanse of ground and the interior of the accused's house was not visible from the Raja's house. How then could he see so much? The easy reply was—Oh! from the garage, am I not a motor driver? But then he had to admit that the garage does not face the accused's house. Not in the least perturbed the smiling reply came that the garage has a back window through which he saw everything. But what about parlours and curtains in the accused's house? Why there weren't any. Apart from the absurdities of this story let us consider how he came to depose in this case. There is no mention of his name in the petition of complaint. The complainant admits that even after he had filed his complaint he had no idea of this man's existence. Then a wonderful thing happened. His lawyer on reading through his wife's letters to him enquired of him if he knew any employee of the Raja of Azimganj. (This cannot be true for the Raja's name does not occur in any of the letters. The complainant did not know any servant of the Raja but he mentioned his lawyer's simple query to his brother in law Pibhuti who in turn passed it on to his cousin Dakhana Rayan Biswas. This man is not a witness, he is said to live at Azimganj. It was he who traced

out Badi-u-Zaman. On the evidence of this gentleman I would not hold a cockroach guilty of misconduct.

Bina's Reunion With Husband

In July 1932 Bina passed her B.A. examination and in September began her post graduate studies as a private student. Her husband says it was against his wishes that she did so, he wanted her to accompany him to Feni after the summer vacation but she refused. Bina admits the refusal but gives the reason for it. On 17th June 1932 her husband wrote her a most insulting letter (Ex. S) black guarding her and her whole family particularly her mother. This letter shows the complainant in a really angry and bitter mood, he says he is sorry he ever married the sickly daughter of poor man whose mother is a shrew. He accuses the whole family of clinging to and fawning upon men with money and in particular to Bari Kaka. But here is something which again leaves one guessing—not a word in this furious letter of 10 pages so much as writing of undue familiarity between his wife and her Bari Kaka. It was not till 5th September 1932 that he wrote and apologised to her and enquired when she was coming back to him and telling that he missed her sorely. Her reply dated 11th September 1932 was that she was quite willing to return to him but not till her college closed she would then spend the vacation with him. It was on 9th October 1932 that Bimal the son of her husband's brother in law reached her to Icm. The date is of very special importance. The complainant's case is that she left Calcutta suddenly because she found she was pregnant not by her husband but by the accused and hence her intelligent anticipation of future events prompting her desire to join her husband as speedily as possible. It is not in evidence when her college closed for the pujan vacation of 1932. She says she was a private student. I am not aware whether that fact need have prevented her from going to her husband earlier than the four weeks that elapsed between his letter of apology and request to go to him and her actual departure. Be that as it may she went on October 9 1932. Her husband says that at once he noticed signs of pregnancy the presence of mucus and the cessation of menses yet he did not insist on her regarding her condition till December. This cannot possibly be true for several reasons. (1) immediately on her arrival he could not possibly have known whether her menses had stopped or not. (2) as the child was born on 13th August 1933 she could not have been pregnant as far back as 9th October 1932. That would make an abnormal period of gestation of about 120 days. Taking the period of gestation to be 250 days it looks as if she must have conceived at the middle of November, 1932 when she was with the husband at F. Apart from that, his own letters to her after she left Feni in April (and carefully treasured by her) show throughout he regarded the

as his own. The following are the letters —(1) dated 5th April 1933 (Ex BB), written the day after she left Feni—he says he misses her terribly and has lost his appetite so his servant Bhagaban gets all the lunches and paternal bhajas. He then enquires, what about your child? write to me about your health. (2) Letter dated 11th April 1933 (Ex CC) begging her to be very careful about her diet and her movements. He also wants to know by what train she is coming to Feni from Chittagong. (She had obviously gone from Feni to Chittagong and would pass through Feni on her way to Calcutta). The letter shows she broke journey for 2 days at Feni and then came to Calcutta.

(3) The next letter, dated 14th April 1933 (Ex DD) reads as follows, 'Since you left yesterday my mind and heart are blank and void. I cannot enjoy anything. I feel I cannot live even for a day without you. On the night you left you lay beside me for one hour. I can still feel the touch of your body. Bismillah my own now that you have become truly my own. Our hearts are one etc.'

(4) On 22nd April 1933 (Ex EE) he wrote to her 'Pray to God morning and night that you may be blessed with a happy handsome boy.'

(5) On 27th April 1933 (Ex FF) he wrote 'With the approach of night I feel that if you were here I would have hugged you in sleep. For want of you I have to hug my pillow.'

These letters definitely show that the reconciliation after the quarrel in the summer of 1932 was complete and that they lived as man and wife and that she must therefore have conceived by her husband. In his evidence the complainant began by saying that his wife's confinement was paid for by the accused when confronted with two of his letters to his wife (Exs V and W—written in July and August) he had to admit that he sent Rs. 70 to his wife and that this was paid to the hospital which charged 7/ per day for her lying in of 10 days. On the birth of the child a telegram was sent to the complainant who on 14.8.33 the very day after the child was born wrote to his father in law saying how glad he was to hear that mother and son were doing well. On 17.8.33 he wrote to his father in law (Ex X) that he was very glad to hear that a boy has been born to us. There followed numerous letters to his wife begging him to be careful about herself and the boy about the precautions she should take against his catching cold even directions about feeding him a Glaxo and enquiring how his hair is growing. Admittedly it was he who chose the boy's name Arun Kumar. In short tremendous enthusiasm on the part of the proud father. His evidence in Court that that enthusiasm was all feigned and inspired solely by pity of the little fatherless child is not borne out by his letters or his conduct and I am very definitely of opinion that the child is his. How else can be explained his letter to his father in law dated 5.9.33 (Ex Z) asking him to invoke

the accused's assistance in securing him the post of Professor of Economics in the Burdwan College

The Closing Incident

We have now reached the closing incident in the married life of this unhappy pair, the quarrel at 1 Dr Rajendra Road in June, 1934. There is only the oral evidence of the husband that it occurred on June 14th and of the wife that it was not till June 23rd. There is some slight corroboration of the wife's version in the evidence of Dr Sisir Mitter though I am not satisfied that he is a wholly disinterested witness. There is nothing in writing either in the shape of a letter or an entry in any diary, to fix the date of the quarrel. The complainant, however, has closely questioned by the Court when he was examined in chief as to his movement just before and after the quarrel. He says he came to Calcutta for the summer holidays on June 19th or 11th and stayed for 2 or 3 days at 1, Dr Rajendra Road when there was the final rupture. After that, he went off to stay with his mother-in-law Bibhuti at 23/2 Gura Road Chatterjee Lane for 3 or 6 days he left for Feni on June 30th or July 1st. That looks as if the quarrel occurred some days later than the 14th June. In cross-examination however he made an attempt to increase the interval between his leaving his wife's parents' house and his return to Feni on June 30th by saying that from Bibhuti's house he did not go direct to Feni but via Krishnagar where he stayed for 4 or 5 days to pick up his luggage.

How They Quarrelled About

The next point for consideration is what they quarrelled about. The husband says he was only reading his wife's diary and her letters. I am not sure what he meant by 'her' letters—whether he meant his own letters to her which were in her box or letters written by other people to her with a suggestion that they were the accused's letters to her—I doubt if the latter was intended. But and the accused were all along living in Calcutta and there could not have been much occasion for them to correspond. It may reasonably be assumed that the complainant was looking through his own letters to her which she had carefully put away in a box. That is what Bibhuti actually says she had done. She however says her husband had taken them out of her box and put them away in his own. Hence the quarrel. The occasion of the quarrel is clear but what was the real cause? A wife does not normally order her husband out of the house merely because she has found him reading her personal diary and his letters to her. That hardly furnishes sufficient provocation to the wife to fly into such a rage and take such an extreme step. One cannot help wondering whether the real cause was that the husband had been threatening his wife with legal action, hence his anxiety to get back his letters to her and her anxiety to

to part with them as if her character could be indicated only with the help of those letters

Incident of June 17

There remains the final allegation of adultery on June 17th 1934 in the bed room of accused's flat. One hardly expects evidence of eye witnesses in an adultery case but it has been offered in this case—not, I fear with any measure of success. Complainant and his brother in law Benode Biswas are the eye witnesses. Let us see how they came to set out together at 2 P. M. on June 17th for the Hindusthan Buildings. Bibhuti and Benode married the complainant's sisters. The complainant having been turned out of his wife's house was staying with Bibhuti to whom he had spoken of the final break with his wife at this juncture according to the complainant and Bibhuti. Benode comes to Calcutta from Nadia on June 17th at 10 A. M. unannounced and unexpected neither Bibhuti nor the complainant had asked him to come—what brought Benode to Calcutta on the fateful day? He says he had heard that complainant was in Calcutta he had long wanted to secure the Nalwa Agency of Accused's firm he had never met the accused and had not written to him. Hence his arrival in Calcutta at the psychological moment. Realising the weakness of the alleged coincidence in cross examination he attempted to prevaricate he really came to Calcutta on the 16th went to Kalighat and returned to Calcutta on 17th—as if Kalighat is out of Calcutta. Be that as it may. Promotha Sarkar was approached by Benode to take him to the accused's residence. Promotha says he agreed to do so he says he went with a double purpose—to introduce Benode to accused and to trap his wife if possible but without disclosing the latter motive to Benode. This in itself sounds improbable. They all went at Bibhuti's house. Promotha had told Bibhuti all about his quarrel with his wife. It is more than likely that he would also tell Benode. Yet Benode supports complainant in maintaining that he was not told they were going to accused's house to try and catch him in a compromising situation with Bina. Incidentally in the petition of complainant Benode is described as an acquaintance as if it was felt that it would be too much of a good thing to say that the only eye witness to corroborate complainant was his brother in law.

Having arrived at the Hindusthan Buildings complainant says he enquired of the darwan at the entrance whether accused was at home and was told he was not. He and Benode therefore waited outside for half an hour. Complainant saw Bina arrive in accused's green Saloon Car. Benode says he did not see her he was looking in the opposite direction says the complainant smoking a cigarette. This is only to keep up the story that Benode was kept in the dark as to the real purpose of complainant's visit. Even after Bina's arrival complainant and Benode waited half an hour outside. It is necessary of course to give the guilty couple

time to undress and get into bed before they can be discovered. After that reasonable intent, complainant and Benode marched upstairs, met a solitary servant in the corridor, ignoring his request to them to sit in a waiting room burst straight into the accused's bedroom, to find them in bed. The story is not convincing. The accused says he has many servants living on the premises and it would not be possible for any one to walk straight into his bed room. It is true the complainant is familiar with the accused's flat, as he admits he has been there on several occasions at accused's invitation, he might therefore very well know which is the bed room. But the accused would surely hear two people coming up the stairs and walking along a long marble corridor before they got to the bed room. The complainant realising the inherent improbability of his story when questioned as to what shoes he wore said he had on rubber shoes, Benode of course, not being in the know wore ordinary shoes—he could hardly with any degree of consistency be able to wear rubber shoes. The story that accused's bedroom was unlocked also carries no conviction. Finally there is yet another consideration of probability which militates against the story set up. If Bina had turned out her husband three days previously it is extremely doubtful if not knowing where her husband lived and what he was up to she should have the hardihood to visit the accused's flat on July 17.

Delay in Instituting Case

Finally there is the matter of 8 months delay in instituting this case. Unless some reasonable explanation of the delay is forthcoming it inevitably draws suspicion on the tangle made allegations. It is in evidence that there was the husband's notice in the *Standard* in October 1931. This certainly proves there was a break but that fact is not in dispute. At the time of that notice complainant sent a registered letter to his wife which she refused. Complainant has not produced it. The defence contends that its non production proves that it contained no allegation of misconduct. It was on February 22 1933 that complainant came to Calcutta not to file this complaint but to attend an examiner's meeting. It is not understood what he was waiting for as he stated in evidence that as far back as October 1931 he wanted to get rid of his wife. It was Bibhut who urged him to do something in the matter. He showed a copy of the *'Kalki'* of February 7 1933 and told him that his wife's name was being bandied about in connection with the accused. The complainant says he then went to his Solicitor with a view to instituting divorce proceedings, it was only on their advice that he started the present criminal case. All I feel called upon to say is that he was very badly advised. A divorce case would have been the proper course to take. The complainant's explanation of the delay are three-fold—

- (i) his place of work is 30 miles from Calcutta.

(ii) the accused is a powerful and influential man against whom he did not venture to proceed

(iii) he had no opportunity to act earlier

None of those reasons is adequate or convincing. He came to Calcutta in October 1934, he consulted lawyers and the result was a notice in the 'Statesman'. There was nothing to prevent his taking legal proceedings then. His fear of the accused as a rich and influential man cannot be regarded seriously. The inordinate delay in instituting this case therefore necessarily tells against the credibility of the story.

In conclusion I have said all I have to say about the Delhi incident. About the paternity of the child I have not the slightest doubt that the complainant is the father. About the incident of June 17, 1934 I am unable to accept the evidence.

On the evidence therefore I find the charges are not sustainable. The accused is accordingly acquitted.

THE MOST MOMENTOUS CRIMINAL TRIAL

The Lahore Conspiracy Case

HARDIALS' EXPLOITS IN AMERICA AND INDIA

Judge on Pingle's Claim to Clemency

(By Lt Col A A Irvine C I E)

The trial of the Dartmoor convicts was a big trial, both as regards its importance and the number of the accused persons and witnesses who took part in it. Amongst other big trials held during comparatively recent years may be cited that of the thirty-seven Camorristi which began at Viterbo in March 1911. It lasted for more than a year, and involved three hundred sittings of the Court.

The trial with which I am now concerned was known at the time as 'The Lahore Conspiracy Case' and the then Lieutenant Governor of the Punjab on the occasion referred to it as the most momentous criminal trial of this generation. In view of its importance to India during a period of especial stress His Honour's pronouncement cannot be considered to have been an over statement of the case.

24 Death Sentences

This trial in respect of which it fell to my lot to be President of the three Special Commissioners who formed the tribunal took place under the Defence of India Act of 1915—an Act framed 'to secure public safety and the defence of British India and for the more speedy trial of certain offences'. It commenced on the morning of April the 26th, 1915, and our lengthy judgment was signed by us nearly four and a half months later. Before writing the judgment we had to record, tabulate and pass under the most careful review the statements of nearly seven hundred persons, and hail likewise to examine a stupendous mass of printed and typewritten

documents together with exhibits of every description ranging from revolutionary flags to bombs fashioned out of ordinary brass ink pots.

The printed complaint filed by the Government Advocate disclosed the names of eighty-two accused, some of whom were absconding and sixty-four of whom actually appeared before us in the dock. Almost all of these were Sikhs, there were a few Hindus, Mohammedans were conspicuous by their absence. At the conclusion of the trial we found it incumbent on us to pass twenty-four death sentences, many others of the accused being sentenced to transportation for life or to lesser terms of imprisonment. The remainder were either discharged during the course of the trial or were finally acquitted.

My two colleagues on the bench of Commissioners were members of the Indian Civil Service (who like myself had been for several years a Sessions Judge in the Punjab Commission) and a distinguished Indian member of the Lahore Bar. Our powers under the Special Act made our work particularly responsible since according to its mandatory provisions our judgment was to be considered final and conclusive while there was to be 'no appeal' from any order or sentence passed by us. The exercise of clemency was of course reserved to His Excellency the Viceroy and to His Honour the Lieutenant Governor of the Punjab.

In the case of one convict His Honour commuted the death sentence to one of transportation. Subsequently in respect of no less than sixteen persons the death sentences were commuted by the Government of India, and on the controversy over the action of the Government I prefer not to comment.

Before coming to more intimate details of the trial which I think may prove to be of interest it seems desirable to recount a brief history of events which led to the passing of the Defence Act.

Har Dayal

As far back as the year 1907 a fiery wave of sedition had blazed its way across India. In Calcutta and other places it had continued to smoulder and by 1912 it had travelled to the Pacific Coast of America where the conspiracy with which it was our duty to deal had its origin. The headquarters of the Indian revolutionary party at first in Vancouver were latterly centred in San Francisco.

At about the end of 1912 there arrived in that region one Hardial a noted Hindu seditionist who commenced delivering a series of lectures on Atheism. This individual although he had been awarded by the Punjab Government and had enjoyed almost to its conclusion a scholarship at Oxford had for some reason become imbued with a malignant hatred of all things British. Abandoning therefore the cult of Atheism for that of revolutionary politics Hardial proceeded during 1913 to tour the country spreading the flame of sedition,

raising funds and securing followers, with the avowed object of waging war against His Majesty the King Emperor, and of massacring or driving out of India every man, woman and child of European extraction. It may be said at once that like so many of his fellow agitators, Hardial was extremely careful of his own skin. Long before the storm had broken in India he had left his dupes to look after themselves and had incontinently vanished.

There were in those days, scattered over California and Oregon, large numbers of Sikh emigrants—men of magnificent physique, well fed, earning high wages, hardened by toil on the fruit farms and in the timber yards. Among these unfortunate, credulous persons the astute Hardial found, as he expected, abundant material on which to exercise his machinations. Forthwith, accompanied by other agitators as virulent as himself, he multiplied his lecturing tours, and in addition to them, initiated a curriculum of seditious propaganda.

Ghadr Movement

His chief instrument of propaganda was the 'Ghadr' (Mutiny) newspaper, the first issue of which bore the date of November 1st, 1913. Its policy, advocating wholesale extermination of the white monkeys, left nothing whatever to the imagination. An ordinary issue was one of ten thousand copies and besides being broadcast over the Pacific Coast, it was smuggled into India by means of the usual postal channels. In December of the same year, it began to appear with a yellow cover, symbolical of the 'dress of martyrs and heroes'. One may here note that saffron is the Hindu religious colour and that in olden times Rajput warriors 'routed to the death' were accustomed to smear their faces with the yellow turmeric before engaging in battle.

A copy of the 'Ghadr' issue dated January the 10th, 1914, is particularly worthy of remark. It contains an account of a meeting at Sacramento, which was addressed by Hardial. Lantern slides of famous revolutionists, and murderers, along with revolutionary mottoes, were displayed, and Hardial deliberately proclaimed that Germany was preparing to go to war with England, and that the time had arrived to return to India for the coming rebellion. Reference was made to the Mutiny of 1857. At a San Francisco meeting on March 20th, 1914, Hardial announced his intention of proceeding to Germany to prepare for the revolution that was fast approaching.

Now, the above dates and the tenor of his pronouncements are full of significance when we remember that in May, 1914, the Austrian Emperor told his Ambassador in Constantinople that 'a European war was inevitable'; that the Serbian assassinations occurred on June the 28th of that year and that England entered the Great War on the 4th of August. The question naturally arises, from what source did Hardial

derive his foreknowledge of events which he proclaimed in the preceding January ?

However this may have been as the result of his inspiration a multitude of Sikh emigrants, during and after July, 1914 began returning to India by Japanese vessels, stirring up trouble and enlisting assistance in the shape of men and money at the various ports en route. Their plan of campaign included the massacre of Europeans and Indian loyalists, the seduction of troops, students and villagers, union with foreign enemies, bomb making and the looting of treasuries.

The Punjab has almost always been fortunate in its rulers, and in that time of peril had for its Lieutenant Governor a man of outstanding strength and personality. Many of the malcontents were interned soon after their arrival whilst others who had league was to follow them. I, presumably because I chanced to be the President of the tribunal was to be reserved to the last by way of a *bonne bouche*. In addition to this we received from the Police a warning that all parcels bearing typewritten addresses might with advantage be soaked in water before being opened. One such parcel reached me and, obeying instructions I immersed it for some time in one of those zinc tubs which, probably from the days of Warren Hastings have continued to do duty as baths all over India. Its contents however proved to be nothing more deadly than a swollen bundle of wordily explosive literature forwarded to me by a lunatic higrant who imagined that he had a grievance against one of my subordinate magistrates.

The well intentioned precautions of the police for our personal safety were sometimes rather embarrassing. On returning one evening to my hotel I found seated in front of my room a stalwart gentleman armed with a mighty lathi. I was informed that he had been detained to act as my guard. At my request he disappeared, but I believe afterwards prosecuted his watch and wordless obtrusively somewhere on the hotel premises in the guise of a bazar sweetmeat seller. A lathi it may be explained, is a seven foot staff of male bamboo furnished at one end with brass or iron knobs. It is much in favour with the Sikh peasantry for reducing to an unrecognizable pulp an enemy's anatomy. The Member of Parliament who once described a riotous assembly of lathiwallas as a 'crowd armed with walking sticks' was even more than usually wide of the mark.

Interesting Exhibits

The monotony of the daily routine was often relieved for judges and accused alike by the production of especially interesting exhibits. For instance, a big trunk seized by the Customs authorities would be opened in court to disgorge a quantity of harmless fancy ware, pen trays, blotting-looks and the like. But out of a false bottom would appear a store of

pistols hacksaws and copies of the 'Ghadr' newspaper. Then there were the ink pot bombs and bombs made out of heavy brass water vessels fitted with screw tops intended for the blowing up of bridges. There were the revolutionary flags in appearance somewhat resembling the national flag of Belgium. These were three striped, blue for the Mahomedan (why green was not chosen I cannot say), red for the Hindu (Who was to bathe in the blood of the oppressor), and yellow for the Sikh (symbolical of his approaching reversion to Hinduism). To my mind the most noteworthy of the manifold exhibits were the illustrated copies of the Bomb and Poison Manuals the contents of which may not of course be divulged. They emanated from Paris to which city an emissary of the conspirators had been sent with a view to his setting up a bomb factory in Calcutta after receiving instruction at the hands of Madame Kama and Krishna Varma a Bengali the well known Indian anarchist of the Paris centre.

A morning spent over such exhibits would always send the accused jabbering interestedly to their midday meal and would afford the tribunal material for discussion during the luncheon hour in our little retiring room. In that very sultry refectory we two effete Europeans would observe with wonder and admiration the meal of our Indian 'confrere'. A strict vegetarian he was wont to consume in addition to a plateful of dates a number of oranges a big bunch of bananas and an entire melon washed down by several cups of very hot and very sweet tea. His fare most assuredly agreed with him, for a more genial and pain striking companion to work with could not anywhere have been discovered.

Perfect Gem of Officialdom

It was during one of these hours of a relaxation that I received a communication which I regard as a perfect gem of officialdom. It took the form of a letter from the then Registrar of the Chief Court, who was responsible for supplying the tribunal with stationery. He wrote concerning his anxiety about the consumption of foolscap pencils and 'Relief' nibs that was taking and would I look into the matter and report, I am afraid that my reply was briefly to the effect that I had somewhat more important work to do during some twelve hours each day (in and out of court) than to keep an eye on 'Relief' nibs *et id genus omne*! Relenting however, at his evident distress I went so far as to add a postscript informing him that those of the accused who could write were allowed pencils and paper for note making. Further, that I personally broke the back of one 'Relief' nib daily, that my I C S colleague wrecked daily no less than three, whilst our Indian coadjutor contrived to make one nib last him for a week—as one might readily deduce from a sample of his hand writing.

During our four and a half months as jail birds we were extremely fortunate in the matter of health, suffering from one the minor maladies

inseparable from very hard brain work in very hot weather. In my own case the malady took the form of insomnia. Instead of getting to sleep at night I would find myself exasperatingly wakeful, revolving in my mind such questions as whether Witness X were sufficiently corroborated by Witness Y in his story about the pistol used in the / dicoity—and so on. As a panacea for insomnia the ordinary modern novel (strange to say) proved absolutely useless, and then of a sudden I chanced upon a sovereign remedy.

In the catalogue of a Bombay book-seller I came across a list of the works of that great prince of story-tellers the late Jules Verne of blessed memory. I had not read one of them since my school-days, but the witchery of them once more fastened upon me, rousing the desire for an absorbing yarn unburdened with sex appeal and the cocktail vagaries of so-called Bright Young Things. In due course there arrived a dozen paper-covered volumes, and there after for an hour or two each night I journeyed round the Moon, sped on a raft to the molten centre of the globe, explored the depths of the sea with Captain Nemo. Like a bad dream the Lahore Conspiracy Case fled from my consciousness until the following morning.

Judgment At Simla

When, at length, the statements of witnesses and accused along with the arguments of counsel had come to an end by permission of the Government we repaired to the cool heights of Simla to consider and write our judgment. In a room littered with formidable piles of documents and law books we set to work, our toil for the first few days being impeded at intervals by the efforts of a visitor in a neighbouring block of the hotel to acquire with indifferent success the melody of 'Where my Caravan has Pested.' Luckily for us his leave was on the point of expiring, his caravan moved down to the Plains and we had peace.

Our judgment written we proceeded to Lahore to deliver our sentences in the Jail, which for the occasion was guarded by troops. There had been reason, it appeared to anticipate a possible massed attack upon the buildings by bands of malcontents who had not yet been laid by the heels, however nothing of the kind occurred.

One Regret

We had been able, I am glad to say to embody in our judgment our warm appreciation of the work of that much maligned body the Indian Police. Always in danger exposed to every sort of threat and inducement on the part of the conspirators who after all were their own countrymen, the personnel of the Police Force remained magnificently loyal to their duty. Indeed throughout the vast conglomeration of evidence produced before us, we learned of only one instance in which a member of the

police had wavered in his allegiance, that of a constable who had gone so far as to agree to sit on the fence and see which way the wind might blow!

The finale of this big trial left me with one regret. It was this—that when so many commutations of sentences were considered necessary by the Government the exercise of clemency was not extended to Veshno Ganesh Pingley, Mahratta Brahman of the Poona district. Of his guilt there could be no question, but I think that before the end came he had realised that he had been made a dupe by others that Englishmen were not the tyrants that he had been led to believe. He was splendidly staunch to his fellow conspirators, his behaviour in court earned our respect. In short revolutionary bomb maker seducer of troops though he had been he was essentially a gentleman—'Indian Empire Review'

PATRIKA CONTEMPT CASE

Following is the detailed judgment of Mr Justice Costello in connection with the Patrika contempt of court case—

I entirely agree with the views expressed by My Lord the Chief Justice

Sir Tej Bahadur Sapru in his argument on behalf of the Respondent. Tushar Kanti Ghosh made the submission that the article which appeared in the "Amrita Bazar Patrika" on the 23rd March last did not refer to any case pending before this Court or to any case decided by this Court either recently or in the past and that assuming in any view of the matter that the article in question amounts to contempt of Court it is at the most a technical contempt and as it does not seek to obstruct the course of justice or interfere with any trial this Court has no jurisdiction whatever to take proceedings by way of summary procedure and that the proper procedure should be by information under section 191 of Cr. Pro. Code.

The first question we have to determine in this matter is whether the article referred to in the affidavit of Mr Collet does amount to contempt of Court and at the outset I think it should be emphasised that we act in these matters not to defend the dignity of the Court but to safeguard the proper administration of justice and to ensure as far as possible that the confidence of the Public in that administration was not to be destroyed or in any way diminished. In that connection one should bear in mind the weighty words of Wills—J who delivered judgment of the court in the case of *Ex parte Davis* (1906 J K B 32) when he said that the principle which is the root of and underlies the cases in which persons have been punished for attacks upon court will be found to be not the purpose of protecting either the court as a whole or individual judges of the court from a repetition of them but of protecting the public and specially those who either voluntarily or by compulsion are subject to its jurisdiction from the mischief they will incur if the authority of the Tribunal be undermined or impaired. Wills J cite a part of the undelivered judgment of Wilmot

C. J. in *Rees v. Almon* (1763) where he said that attacks upon the judges excite in the minds of the people a general dissatisfaction with all judicial determinations and whenever men's allegiance to the laws is so fundamentally shaken it is the most dangerous obstruction of justice and in my opinion calls out for a more rapid and immediate redress than any other obstruction whatsoever not for the sake of the judges as private individuals but because they are the channels by which the King's justice is conveyed to the people. To be impartial and to be universally thought so are both absolutely necessary for giving justice that free open and unimpaired current which it has for many ages found all over this Kingdom. These words of Wilmot C. J. have been quoted with approval in innumerable cases throughout that 170 years which have elapsed since they were written and despite the doubt as to their applicability to the present instance which Sir Tej Bahadur Sapru sought to establish they must be taken to constitute the appropriate criterion and the right canon of interpretation for use in a matter of the kind now before us. Applying the principle enunciated above I can only come to the conclusion that the article is not only a contempt but a contempt of a very serious nature in that the first paragraph of the article is directly calculated to instil in the minds of the people a mistrust of and dissatisfaction with the administration of justice in this presidency. It seems clear that the object and intention of the attack was to induce the public at large to believe that future cases in the court will be dealt with by Judges who are no longer free from outside control or influence especially in proceedings to which the executive in some form or other is a party or in which the executive is interested. A more scandalous and mischievous assertion against any court as such it is difficult to imagine. To call the sort of statement published or permitted to be published by the Respondents in this case a fair comment or a mere technical contempt is to my mind an entire misuse of words and is a contention which must be rejected. It is to be observed that the question whether a particular publication be libellous or contemptuous and the construction of that publication is as has been said in many instances a question of the Court which deals with the matter—see per Paterson J. in *re Crawford*. This brings me to the question of the jurisdiction of the Court to punish a contempt of this nature in summary proceedings such as is present before the Court itself because in the case I have just referred to—Crawford's case it had been objected that the court could have no general power of commitment for libel published out of Court. Paterson J. in the course of that case said that in *Rees v. Almon* there was a very learned judgment by Chief Justice Wilmot in which he satisfactorily showed that a Court of Record has power to punish by commitment for contempt or libel published while the Court is

sitting Paterson J. then stated 'there must be a choice as to the mode of proceedings for he (i.e., Wilmot C J) says that the punishment may be by indictment or committal for contempt. He treats it throughout as a matter for election.' Paterson J then held that the court had the power, i.e. to commit and stated "that is clear law." It has been strenuously argued in the proceedings now before us that as there is no question of a contempt in *Facie Curie* or in connection with a pending or recently determined cause. This court although admittedly a court of record has no power to deal summarily with the offender. There are however many authorities for the proposition that it is well within the competency of a High Court in India to deal summarily with a contempt consisting of scandalous or scurrilous comments made in connection with a matter already adjudicated upon and in this connection having regard to what has been already said by My Lord the Chief Justice, I need only mention the case of *In re Saljabodha Ramelandra Ada Beddi*, 47 Bombay 76 where Martin J referred with approval to the judgment of Wills J (from which I have already quoted) and to the undelivered judgment of Wilmot C J. He also referred to several previous cases in the Bombay High Court in which similar points had arisen. I am wholly at a loss to understand how it can be contended that it would be right to proceed by way of summary procedure in a case where a scandalous attack had been made upon a court by reason of something which had happened in the past but wrong to proceed in like manner where scandalous attack is made upon the court which from its very nature must have a disturbing and indeed pernicious effect upon the mind of the public in general concerning the purity and impartiality of the adjudication of every succeeding case coming before the court or at any rate in connection with the ever constant succession of cases in which in some shape or form the executive is a party interested. In my opinion to endeavour to proceed by way of information in case of contempt by scandalising the whole court would be to attempt something which upon a reasonable visualisation of its meritable concomitants and implications would appear to be not only patently inconvenient and unseemly but also practically impossible. Sir Tej Bahadur Sapru based the whole fabric of his argument about the question of jurisdiction upon the dictum of Lord Morris in *Velvetts St. Julien*. It has already been commented upon by my Lord and on the strength of that one authority the learned advocate has invited us to hold that the dictum of Lord Wilmot C J has long since ceased to be a correct interpretation of the law. It cannot be doubted and indeed it is beyond question that if the views expressed by Wilmot C J hold good and apply in this country then it is clearly competent for this High Court to proceed by way of summary procedure in any case of contempt by scandalising the court and so the whole of Sir Tej Bahadur Sapru's argument falls to the

ground. The learned advocate found himself bound to admit to the fullest extent that the judgment of Wilmot C J has indeed been quoted with approval and the doctrine applied in a long series of cases many of which are tabulated at p 30 Sir John Fox's monograph on 'contempt of court' to which Sir Tej Bahadur Sapru referred as lending support to his argument. It is to be noted however that Sir John Fox at p 73 of his book affirms that by a series of decisions and by citations Wilmot's doctrine has become part of the law of England though he queries the question whether there is any solid ground for the contention that it was the law by immemorial usage in the year 1763. Sir Tej Bahadur Sapru was quite unable to place before us even one case in which Wilmot's doctrine has been dissented from or even adversely commented upon by any court with the solitary exception of a dissenting judgment by an Irish Judge Fletcher J in a case which has never been properly reported. As I indicated to Sir Tej Bahadur Sapru in the course of his argument it seems to me to be asking too much of his or any other court to invite it to reject Wilmot's doctrine on the strength of this one dissenting opinion which stands alone in the long catenation of decisions agreeing with the principles laid down in *Alman's case*. That the doctrine enunciated by Wilmot and the procedure approved by him are still valid and subsisting in England is in my opinion quite clear from the judgment in *Perry (1900) 2 Q B 36*, *Rex vs Davis* (Lb Supra) and *Rex vs Editor of the New Statesman* (44 T L R 301) to which reference has been made by my Lord the Chief Justice. It seems to me therefore with all possible respect to Lord Morris that his lordship's speech in *McLeod vs St Aubyn* cannot be taken as being a correct enunciation of the law if indeed it was really intended to be so. It may well be the noble and learned lord was doing no more than stating as a matter of fact that the proceedings by way of summary procedure were obsolete—obsolete for the reason that with the spread of education in England and the growth of a wide spread healthy public opinion and in general respect for the administration of justice occasions for resorting to summary procedure in cases of contempt by scandalising the court had been few and far between if not wholly non-existent. It happened that the point now under discussion came before the High Court of the Irish Free State in the year 1925 in the case of the *Attorney-General vs Sean J O Kelly* (1925 T L R 101) when a Bench consisting of Sullivan P, Meredith and Hanna J J held that the committals for contempt of court by scandalising the court itself have not become obsolete and that the dictum to the contrary in *McLeod vs St Aubyn* (1893) A C 349 cannot be accepted as accurate having regard to the subsequent decision in *Rex vs Gray* (Lb Supra) and *Rex vs Editor of the New Statesman*. In O Kelly's case as a preliminary objection had been raised that the court had no jurisdiction to entertain the application made by the General that an order of attachment should issue against the

Nation newspaper *Sullivan P* in his judgment said that in order to appreciate the argument that was addressed to the court on this preliminary point and to rule upon it was necessary to consider in the first place the origin and nature of the power to commit and then he stated that the opinion of Wilmot in *Rex vs Alvan* is regarded as authoritative on this question. It is referred to by Palles C B in *Attorney General vs Hassan* 32 L R Ir 220 and I quote the judgment of the Chief Baron from the report of that case at page 271—"the judgment of the Chief Baron set forth in full the opinion of Wilmot C J—"and then *Sullivan P* quoted in extenso the judgment of Lord Blackburn in *Shipworth's case* L R 90 G 230 at 232 and proceeded thus —

The power so defined has been exercised when the occasion required by the Courts in England and Ireland, not only (1) where some contempt has been committed in the face of the Court or (2) where comments calculated to interfere with the course of justice have been made on cases pending in the Courts but (3) where scandalous matter of the Court itself has been published. This proposition was not disputed as regards the first and second classes of contempt I have mentioned, but the opinion of the Privy Council in *McLeod vs St Aubyn* (1899) A C 519 was relied on as showing that committals for contempt of Court by scandalising the Court itself have become obsolete. In view of the subsequent decisions in England in *R v Gray* (1900) 2 Q B 36, and *R v Editor of the New Statesman* (41 T L R 301) I cannot accept the dictum in *McLeod's case* as accurate. In each of these cases the English courts recognised and exercised the jurisdiction to punish on summary process the Editor of a newspaper for contempt of court in publishing scandalous matter of a judge with reference to his conduct in judicial proceedings.

Haura in his judgment (at p 330) touching the question of whether the procedure by attachment was one within the competence of the court expressed the opinion that it was and that it was not obsolete or in any way confined and said that he could not accept the arguments that where the contempt was in *facie curiae* the cases were always dealt with either by the judge himself or by the court nor the view that contested cases of consequential or constructive contempt that is those other than those committed *ex facie curiae* were always dealt with before a jury by indictment. The learned judge then said. The position of this power of attachment is made clear by the judgment in *Kesane's case* (21 I R Ir 220). Each of the three procedures was open for contempt of court. The cases show that for many years before the hearing of *McLeod vs St Aubyn* (1899) A C 519 the practice of proceeding by attachment had not been used, so much so that Lord Morris stated in that case that it had become obsolete. However this may be, it is clear that it has been frequently resorted to both in

England and Ireland in the succeeding years during which the Press attained such a widespread influence so that, though it might have been at one time dormant it had at the date of constitution become a living procedure, with all its ancient powers. The latest case is but a few weeks ago, *P. L. the Editor of the New Statesman* (44 T L R) reported in the current Times Law Reports.

Meredith J although differing from the other members of the court on the merits of the particular case agreed with the President and Hanna J on the question of the extent of the jurisdiction of the court.

In my opinion it cannot be gainsaid that courts of record have an inherent power of punishing and in a summary way any act done or writing published calculated to bring the court or a judge of the court into contempt or to lower its authority i.e. a class of contempt characterised by Lord Hardwicke in *re Read and Hugginson* (1742) 2 A T K. 471 as scandalising a court or a judge) that is part of the common law of England and was so at the time when that law was introduced in India in the 15th century and then (forward) administered by the courts in this country. Thus it comes about that the High Courts in India have inherited a similar power. It happens that there does not appear to be any precedent exactly on all fours the present proceedings with the exception of a case to which I shall refer in a moment but there as appears from the judgment delivered by my Lord the Chief Justice and as already indicated by me a number of decisions sufficiently close and analogous to the present case to warrant the assumption that the powers of this Court are wide enough to enable it to deal with the Respondents herein in a summary way and in my opinion this is essential where it was desirable for action to be taken shortly and summarily owing to the obstruction to the administration of justice created by the precise nature of the allegations contained in the article and its mischievous effect in the minds of the public and in particular of all litigants and accused persons. Neither Sir Tej Bahadur Sapru nor Mr B. N. Banerji were able to place before us a single example of a contempt of court having been dealt with by way of information or by other method than *breve manu* but on the other hand there is the case of *in re an Advocate of Allahabad* 30 All L J 125 (which furnished the exception mentioned above) where it was definitely held by the Allahabad High Court that the jurisdiction of the court to punish every contempt is not confined to cases where the aspersion which is alleged to amount to contempt is a reflection upon a particular Bench in connection with the conduct of a particular case but extends to cases where a general aspersion is made upon the character and capacity of the court or a judge independently of any case. The cases of *in re Abdul Hassan Jandaz* 45 711 and *Herz Graf* (1900) 2 Q B D 30 were relied upon. It happens that Sir Tej Bahadur Sapru appeared also in the Allahabad ex-

Advocate for the respondent and he appears to have then put forward the same kind of argument as that which he has advanced in the present proceedings before us, an argument largely founded on the dictum of Lord Morris case with regard to which the Allahabad Bench said as follows —

'Once it is conceded that to scandalise the court is a contempt then any publication which scandalises the court and lowers its prestige is clearly a contempt even though there is no record that similar publications have been held by the courts in the past to constitute contempt. As we have already observed, general aspersions upon the character and the capacity of the court must be comparatively rare and the absence of any reports of such cases in our view, affords support for the contention of learned counsel for the opposite parties. Learned counsel further contended that the remedy where a court and not a particular judge has been defamed should not be by way of proceedings for contempt of court but by criminal proceedings at the instance of the Government advocate under the provision of section 191 of the Cr Procedure Code. We are unable to agree with this contention. The fact that proceedings may be directed against a person who has defamed the Courts generally is no reason for holding that he may not be proceeded against for contempt of Court. Criminal proceedings as well as contempt proceedings lie against a person who has committed contempt of Court by indulging in illegitimate criticism of the conduct of a particular judge and we see no reason in principle for holding that where a Court generally has been defamed, proceedings for contempt of Court do not also lie against the delinquent. We would therefore observe in this connection that proceedings under section 191 of the Cr P C are initiated by the representative of a Government with the previous sanction of the Governor General in Council or the local Government. It is for the Government to decide whether such proceedings be instituted or not. If the contention of the learned counsel for the opposite parties is sound then the High Court would be powerless to protect itself in a case where the grossist allegation against the Courts had been made but where the Government refused it might well be for purely political consideration, to sanction a prosecution. We are clearly of the opinion that the inherent power of the Court to punish every contempt of Court is a power which is essential in the interest of the administration of justice and that power is not restricted in any degree by the provisions in the Cr P C relating to proceedings which may be instituted with the sanction of the Government where the Courts or His Majesty's judges had been defamed.

In our opinion the law upon this matter is not in doubt. It has been clearly enunciated in a number of decisions to many of which we were referred by the learned counsel for the opposite parties and by the learned Government advocate.

'We are therefore clearly of the opinion that neither on general principle nor in a recorded decision is there any support for the contention of the learned counsel for the opposite parties that the Court is not empowered to punish contempt where the alleged contempt consists of a general defamation or aspersion of the Court and not a particular judge in regard to his conduct of a particular case. Learned counsel has been unable to cite one single relevant authority in support of his arguments nor has he been able to suggest any cogent reason for differentiating between the cases of a defamation of a particular judge or a particular Bench and the defamation of the Court generally. The distinction which he has attempted to draw is in our judgment clearly illogical and unsound.

I respectfully agree with the statement and adopt it as representing the correct view of the law. The objection taken to the jurisdiction of this Court in the present proceedings has therefore no substance in it and in my opinion must be rejected. With regard to the merits of that case I would respectfully adopt the language used by Sir Norman McLeod C J *Emperor v. Balrishi Na Gerdul* 46 Bombay 592 at page 621 and to say that the article published on March 23 was calculated to excite in the minds of the people not only the impression that persons could not get a fair trial at the hands of the Court alleged to be under the influence of executive authorities but also a general dissatisfaction with judicial determination so that the danger was created that the people's allegiance to the laws might be fundamentally shaken and a most dangerous obstruction to the administration of justice created. The administration of justice within this presidency has been entrusted to us we have the power in execution of the trust imposed upon us to provide that such dangers, when they arise shall be removed and in exercising these powers we seek not so much to protect ourselves as to protect the people from the evil which will result if their faith in the authority and justice of our tribunals be impaired.

The Respondents in this case have made no real attempt to excuse or palliate their conduct. They have simply said in effect 'this article is fair comment and we have done no wrong.' In such circumstances I think we must inflict upon them some punishment which will bring home to their minds the fact that in our judgment they are entirely wrong and also realisation that their action in publishing the article was in the highest degree improper and detestable.

repairing ornamenting finishing, or otherwise adapting for use for transport or for sale of any article or part of an article

False statement—S 171 G I P C

False trade description—means a trade description which is untrue in a material respect as regards the goods to which it is applied and includes every alteration of a trade description

Ferry includes a bridge of boats pontoons or rafts swing bridge a flying bridge and a temporary bridge and the approaches to, and landing places of a ferry

Fictitious stamp—S 263 (3) I P C

Force—S 319 I P C

Forged Document—S 470 I P C

Forgery—Ss 463 464 expln I P C

Fraudulently—S 25 I P C

Gamung—includes rain gambling

Ganja—is an intoxicating drug being a preparation of the hemp plant

Giving false evidence—S 192 I P C

Good faith—S 50 I P C

Goods—means and includes every kind of movable property

Goonda—includes a hooligan

Government—S 19 I P C

Government of India—S 16 I P C

Gratification—S 161 expln I P C

Grievous Hurt—S 390 I P C

Guardian—means a person having the care of the person of a minor or of his property, or of both his person and property

Habitable room—means a room constructed or adapted for human habitation

Hackney carriage—means any wheeled vehicle, drawn by horses and used for the conveyance of passengers which is kept offered or placed for hire by the hour or day or according to distance

High Court—S 4 (j), Cr P C

House breaking—S 445, I P C

House-breaking by night—S 446 I P C

House trespass—S 442 I P C

Hurt—S 319 I P C

Hut—means any building no substantial part of which, excluding the walls up to a height of eighteen inches above the floor or floor level is constructed of masonry, steel iron or other metal

Illegal—S 43 I P C

Illicit Intercourse—Ss 372 373 I P C

Imprisonment—shall mean imprisonment of either description as defined in the Indian Penal Code

Injury—S. 44, I P C

Inquiry—S. 4 (k) Cr P C

Instrument of Gaming—shall include books or registers in which rain gambling wagers are entered all other documents containing evidence of such wagers and anything used as a means of rain gambling

Intoxicating—Drug means (i) ganja bhing or suddhi, charas and every preparation of the hemp plant *cannabis sativa*

(ii) every admixture of and every intoxicating drink made from, any article referred to in sub-clause (i) of this clause, and

(iii) any other intoxicating drink or substance which the Local Government may specify in this behalf by notification, with every preparation or admixture of the same but does not include opium

Judge—S. 19 I P C

Judicial Proceeding—S. 193 expln. I P C

Juvenile offender—means an offender whom the Court after making such enquiry (if any) as may be deemed necessary, shall find to be under sixteen years of age

Keeper of a Lodging House—shall mean the person to whom a license for the reception of lodgers in any house shall be granted

Keeper of a Sarai—includes the owner and any person having or acting in the care or management thereof

Kerosine—means any inflammable hydro carbon (including any mixture of hydro carbon or any liquid containing hydro-carbon excluding motor spirit) which—

(a) is made from petroleum and (b) is intended to be or is ordinarily used in liquid form for purposes of illumination

Kidnapping from British India—S. 360, I P C

Kidnapping from lawful guardianship—S. 361, I P C

King's coin—Every coin which is declared to be legal tendered shall be deemed to be king's coin

Land—shall extend to messuages, and all other hereditaments, whether corporeal or incorporeal and to any share thereof

Land or water—S. 141 (?) Cr P C

Lawful Guardian—S. 361, expln., I P C

Leading Question—S. 141, Indian Evidence Act.

Legal proceeding—means any proceeding or inquiry in which evidence is or may be given, and includes an arbitration

License—means a license granted by a proper authority

Liquor—means intoxicating liquor, and includes spirits of wine, spirit, wine tari pachwai, beer, all liquid consisting of or containing alcohol and any substance which the Local Government may, by notification declare to be liquor

Local Government in Bengal—means the Governor of Bengal

Local Law—S. 42, I. P. C

Losing wrongfully—S 23, I P C

Lunatic—means an idiot or person of unsound mind

Lurking House trespass—S 443, I P C

Lurking House trespass by night—S 444 I P C

Magistrate—includes all persons exercising all or any of the powers of a Magistrate

Mail bag—includes a bag box parcel or any other envelope or covering in which postal articles in course of transmission by post are conveyed, whether it does or does not contain any such article

Maintenance order—means a decree or order other than order of affiliation made by a court in the exercise of civil or criminal jurisdiction for the periodical payment of sums of money towards the maintenance of the wife or other dependants of the person against whom the order is made

Making a false document—S 464 I P C

Man—S 10 I P C

May presume—S 4 Indian Evidence Act

Member of an unlawful assembly—S 147 I P C

Minor—means any person who shall not have completed the age of eighteen years and minority means the status of such person

Misappropriation of property—S 403 expln 1 I P C

Mischief—S 475 I P C

Month—S 49 I P C

Motor spirit—means any inflammable hydro carbon (including any mixture of hydro-carbon or any liquid containing hydro carbon) which is capable of being used for providing reasonably efficient motive power for any form of motor vehicle

Motor vehicle—includes any vehicle carriage or other means of conveyance propelled or which may be propelled on a road by electrical or mechanical power either entirely or partially

Movable property—S 22 I P C

Murder—S 300 I P C

Non bailable offence—S 4 Cr P C

Non cognisable case—S 4 Cr P C

Non cognisable offence—S 4 Cr P C

Not proved—S 3 Indian Evidence Act

Offence—S 4 I P C

Officer of police—includes village-watchmen

Omission—S 33 I P C

Open court—S 313 Cr P C

Opium—includes also poppy beads preparations or a mixtures of opium and intoxicating drugs prepared from the poppy

Oral evidence—S 119 Indian Evidence Act

Ordinary powers—S 36, Cr P C

Pachwai—means fermented rice millet or other grain, whether mixed with any liquid or not, and any liquid obtained therefrom, whether diluted or undiluted, but does not include beer

Person—S 11 I P C

Place—S 4 (q) Cr P C

Pleader—S 4 (r) Cr P C

Police—includes all persons who shall be enrolled in the police force by the Local Government

Police officer—means an officer in charge of the police station a police officer making an investigation under chapter XIV of Cr P C or any other police officer not below the rank of Sub Inspector

Police station—S 4 (s) Cr P C

Possession—S 27 I P C

Proclaimed offender—S 43 (2) (iii) Cr P C

Property mark—S 479 I P C

Prostitution—S 373 expln 1 I P C

Proved—S 3 Indian Evidence Act

Public—S 2 I P C

Public document—S 74 Indian Evidence Act

Public Holiday—includes Sundays New year's day Christmas day if either of such days falls on a Sunday the next following Monday Good Friday and any other day declared by the Local Government by notification in the official Gazette to be a public holiday

Public Nuisance—S 268 I P C

Public Prosecutor—S 4 (t) Cr P C

Public servant—S 21 I P C

Rape—S 375 I P C

Reason to believe—S 96 I P C

Re examination—S 137 Indian Evidence Act

Relevant—S 3 Indian Evidence Act

Rioting—S 146 I P C

Robbery—S 390 I P C

Secondary Evidence—S 63 Indian Evidence Act

Sessions Division—S 7 Cr P C

Shall Presume—S 4 Indian Evidence Act

Special Law—S 41 I P C

Special Magistrate—S 14 Cr P C

Stolen property—S 110 I P C

Sub division—S 4 (i) Cr P C

Subdivisional magistrate—S 13 Cr P C

Subordinate magistrate—S 5, Cr P C

Summons Case—S 4 (b) Cr P C

Theft—S 378 I P C

Thug—S 310 I P C

- Trade Mark—S 478, I P C
 Undue influence—S 171 C, I P C
 Unlawful assembly—S 141 I P C
 Using a false property mark—S 481 I P C
 Using a false trade mark—S 480 I P C
 Valuable security—S 40, I P C
 Vessel—S 48 I P C
 Voluntarily—S 49 I P C
 Voluntarily causing hurt—S 312, I P C
 Voluntarily causing Grievous Hurt—S 322 I P C
 Warrant case—S 4 (w) Cr P C
 Woman—S 40 I P C
 Wrongful confinement—S 340 I P C
 Wrongful gun—S 23 I P C
 Wrongful Loss—S 23 I P C
 Wrongful restraint—S 339 I P C
-

VERNACULAR WORDS.

Vernacular

English

as + Sita	Declared cultivated
1 wab	1/4 share
lhi	Illness
rdhar	Half produce rent
	One who cultivates on a yearly agreement
lhinastha swatwa	giving half the crop to his landlord
6 l hha	Subordinate to tenant's interest,
Agrahara	Shrubs and trees not useful as timber
Al	Tenancy on a lease rent (Dacca)
	Field boundary boundary line of any plot
	or land raised boundary mark between
	fields
Ami	1/4 free grant of land
Alhur	Final list
Almat	Conventional signs used in maps
Almu L	Unaccountable
Amalari Amalnamā	Writing preliminary possession
Aman	Winter fully
A mil	In agreement or discrepant
Anabadi	Unconventional
Ana	Share
Anak	Proportionate according to respective
	share fractional
Apan dakhai	Own possession
Atami	Tenant doctor
A s lha	Invaded
Asi	Old formed lands main land
A sthaya	Not permanent temporary
Atra swatwa	This interest
As	A kind of paddy that ripens in Bhadra
Anai	First class
1 wab l (pro bābat)	Irrevocable holder of a tenancy (Jalpaiguri).
Badai sutra	By virtue of exchange
Da lar	Correction mistake
Bag cha	Garden

Vernacular	English
Ba hal	Confirmed
Ba hali	Revenue-free, confirmed not resumed
Bud	Low lands running like channels through jungly areas and cultivated (Dacca and Mymensingh)
Baidyottar	Lands granted rent free to physician or Baidya family
Barshnavottar	A kind of rent free tenure.
Bakiva	Arrears
B. lu	Sand
Ba nam	In the name of belonging to
Bandhakdata	Mortgagor
Ba dhakgrihita	Mortgagee
Baudhak sutra	By virtue of mortgage
Bandh	Embankment general) Water Reservoir (Western Bengal)
Bandobast	Settlement
Bankar	Pent for gathering wood etc
Bantak sutra	By virtue of partition
B. or	Low lands running like channels through jungly areas and cultivated.
Barat	Cross reference
B. r burdan	Travelling charges (an adwab)
Barga	Produce paying tenancy
Barga dagi	Square-plot surveying
Bari	} Homestead
Basat	
B. stu	Homestead land
Barsha	Low land rice, also land suitable for such rice.
Basat praja	Homestead tenant.
Bata dag	A plot with a fractional number
Batar	Same as ul. (Dacca).
B. til	No d
Batwara	Partition
B. vā	Seller or vendor
B. v. fu	Presumed
B. v. fu nichkar	Presumed rent free
B. v. fu jogva nichkar	Pent free (resumable)
Be-ā ni dakhil	Unlawful possession

Vernacular

English

uma, be-nami उमा बेनामी	Forced labour a service tenureholder who renders menial service (Mymensingh)
	Transaction in the name of another
	The person in whose name such a transaction is made
jal जल	} Out of serial order
ithal इथल	
abita अबिता	Informal not certified
h ह	} Produce rent
lag लग	
Bhagchasi भगचसी	Cultivator of a Bh g tenancy
Bhadai भदाय	Autumn crops
Bhagottar भगोत्तार	A rent free tenure
Bhag khazana भग खजाना	Iterally rent in kind but in Rajshahi it means a tenancy where the rent is a quarter of the produce plus a money rent
Bharat Samrit भारत समरित	} Emperor of India
En Sri Bharatcswar एन श्री भारतस्वर	
Markar Bahadur मार्कर बाहदुर	
Bhatan भटान	Service tenure of a ministerial employee (Rajshahi)
Lhita लहिता	High land
Bhiti भिति	Paired land
Bhuti भुति	Cash advance given to an Adhwar (Jalpai guri)
B bali ब बाली	Disputed
Bib dha swatwa बिब द्धा स्वात्वा	Miscellaneous rights
Bichan ka bi (Rajshahi) बिचन का बी (राजशाही)	
Bichia jala बिचिया जाला	Seed bed
P graha प ग्राहा	Idol
Ikrai इक्रेय	Sale
B kretā ब क्रेता	Vendor
Bd बद	Marsh
B! gashti Chakaran ब! गश्ति चकारन	A service tenure held on condition of performing service connected with watch and ward as distinct from rangasti chakaran (Midnapore)
Li sh anushanga लि श अनुशंगा	Special incidents (of a tenancy)
B st rit ब स्त रिट	} In detail
B täng ब तंग	

Vernacular	English
'B' number	Number in Collector's general register of revenue free properties called Register B
Boro	A kind of paddy
Brahmottar	Rent-free tenure
Brata bhiksha	A kind of 'rent free' tenure (Bakarganj)
Brithi	A rent free grant
Bujharat	Local explanation
Chaharam	Fourth class used in classifying lands in unulating country
Chak	A plot in the Thakbust map
Chakaran	A service tenure
Chala	Cultivated high land (banks of a tank)
Chanda	Fixed survey station
Chandina	The holding of a shopkeeper
Char	Alluvial land
Charu	Right of grazing
Chareh	A revision of the rent demand intermediate between two regular settlements
Chasipraja	Cultivator
Chatun	High fallow land
Chauhalli	Boundary
Chhanbari	Short thatching grass (Jalpaiguri)
Chhap	Concealed
Chhara bari	Deserted homestead site
Chhirti	Abandonment (of holdings)
Chhit arazi	A block of a mauza separated from the parent mauza
Chirgi	A kind of rent free land
Chirasthali	Heritable land not held for a limited period
Chthi	Paper showing measurement of fields
Chukandir	Pent paying tenant below a jotedar (Jalpaiguri)
Dag	A field plot
Dumi	Permanent
Dhar	Path
Pahi	Land formed out of old fallows yielding minor crops at intervals and having no <i>ails</i> (Minnapore)
Dakhl	In the possession of
Dakhikar	Occupant also possessor of an interest.

Vernacular.	English
Dakhli swatwa bisishita	Possessing rights of occupancy
Dakhli sawtwa sunya, bihin	Not possessing rights of occupancy
Dakhila	Rent receipt
Dakhil kharij	Mutation
Eân bikray kshamatâ pripta	Transferable
Eân bikray kshamatâ rahit	Not transferable
Dang	Abbreviation of 'darnun' which means on account of or 'dikhli' which means 'in possession of'
Dangā	{ Tanks excavated in a <i>bil</i> for preserving fish (<i>Dacca</i>) { High arable land
Dan sutra	By virtue of gift
Dar	Subordinate
Darā	Water channel (Western and Northern Bengal)
Darnaat	Entire
Das-sala	Decennial (settlement)
Lāv sudi, (khai khalisi)	Usufructuary mortgage
Debottar	Dedicated to God
Digar, Lagar, Dahar	Cow path (<i>Midnapore</i>)
Dighi char	Land bank submerged at ordinary high tide
Dihat hisar	Share in a mauza or kismat (<i>Mymensingh</i>)
Dendar	Judgment debtor
Dhaki	Produce-paying tenancy (<i>Dacca</i>)
Dhala	Uncultivated sloping land (<i>Midnapore</i>)
Dhani	Rice land
Dhanya kar ri	Produce paying tenancy
Dhol shuhrat	Proclamation by beat of drums
Dhulat krishi (Rabi)	Crops that are gathered in Falgoun and Chaitra
Diara	Alluvial formations
Diara mahal (taluk)	Islet formed by resumption of alluvial accretions
Dighali	A kind of tenure with fixed rent (<i>Mymensingh</i>)
Ding	An abbreviation for 'Digar', means and others "
Doem	Second quality (land)
Doem k'iaun	Regulation II of 1819

Vernacular	English
Dofash	Twice cropped
Dahala	Low arable land (Jalpaiguri)
Daul	Statement of rent or revenue
Ek fash	Once cropped
Ekun	Total
Ekwal	Amalgamated statement
Elika	Jurisdiction
Ewaz sutra	By virtue of exchange by exchange
Fard	Last
Fasl	Crop
Fasl mukhi	Yearly assessment of rent on the part of a holding which bears crops (Midnapore)
Faut Firar	Dead and absconding
Fauti	Intellectual property (<i>see above</i>)
Fazil	Excess
Firari	Abandoned relinquished
Fihrist	Index
Gair mukarrari	Rate of rent not fixed
Gar	Average ditch
Gar bandobasti	Unsettled
Garia k. patit	Unculturable fallow
Gati	A tenure in Faridpur, Jessore and Khulna
Giri (Jalpaiguri)	The person under whom an adhkar (q. v.) holds lands
Girwi	Mortgage (Mymensingh)
Gochar or gobām	Pasture land
Gumashita	Agent
Gopath	Cattle track
Goshwara	An abstract of the rights, areas and rents shown in records
Gram kharchā	An abwab expenses of the zamindars mufassal staff totalled and assessed on the raiyats at so much per rupee of rent
Gunaḷ	Offset scale
Guz rat	Through
Haimantik	Winter
Hajat jama	Rent in aheyanee.
Hak	Right
Hokiat	Tenure

Vernacular	English
Hāi	Present, recent, the commonest measure of land (Jalpaiguri)
Hālat	Path (village highway, broader than a path) (East Bengal)
Hāi bichrā	Seed bed
Hāla (pr. Hāwāla)	A charge
Hār mukarrarā	Rate of rent fixed in perpetuity (Midnapore)
Hār rakm	Rent which is neither cash nor produce (Midnapore)
Hāi	Cultivated lands
Hār zamin	Land under cultivation
Hib'zāt	Relating to a gift
Hibān'na	Deed of gift
Hāsh prishak	Separate account
Hānā	Share
Hāziri rāyāt	One who pays rent direct to landlord's main cutchery instead of to local tahildar or maddal
Hāra	Farming lease
Hāmāi	Joint undivided
Hā	Continuation
Hā'fa	Increase, additional rent
Hāfā	Surrender
Hāmāi (pr. Hāmad)	Usufructuary mortgage
Hāzira (char)	Island thrown up in navigable river
Hāi	Rice land (Midnapore)
Hāi	Marshy land, water channel
Hāi bhātā	High land where paddy seedlings are grown
Hāi	A kind of paddy grown on flooded fields (Mymensingh)
Hāker	Fishery right or rent
Hāi ecchan	Irrigation
Hāmā	Rent
Hāmābandi	Rent-roll
Hāmā mīf	Non rent paying, generally according to local custom (Midnapore)
Hāmā jogya	Liable to payment of rent
Hāmā hā	(canal or channel) for irrigation purposes and leading out of a river (Jalpaiguri)

Vernacular	English
Jan	A narrow water passage (Mymensingh)
Janch	Check of the record
Jarip	Survey chain
Jautuk	Rent free grant at the time of marriage (Dacca)
Jinswar	Crop statement
Tot	A form of tenancy
Kahuliyat	Co-interpart of lease
Kam mukarrari	Permanent tenancy at fixed rent
Kam	Permanent In Bakarganj and Faridpur this connotes permanence of rent as opposed to chirasthary q v which refers to the duration of the tenancy
Kali	Cultivated uplands (not classed as dahi) (Mylapore)
Kam	Shortage
Kanda	High land (Mymensingh)
Kanti	Dividers
Karshi	A cultivating holding
Karari	Fixed used also in regard to land which has not been diluviated
Kat kabili	Mortgage condition of sale
Kharit	A kind of rent free
Kharidat	Usufructuary mortgage
Kharid	Threshing floor
Kharina	Rent
Kharina idin pradin ma	Rent not being collected
Kharina hri lhar jogya	Rent liable to enhancement
Kharina dharyan	Rent is not settled
Kharinar jogya	Liable to payment of rent
Kharar	{ Lands in immediate possession of land { lords
Kharidat	{ Threshing floor
Kharidat	{ Own cultivation of a landlord
Kharidat	Preliminary record writing
Kharidat kharid	Purchased portion
Kharidat khud	Mosque, literally House of God.
Kharidat jati	Literally excavations and waste, unassessable waste
Kharidat sare	By virtue of purchase

Vernacular	English
Kharaja	Separated independent taluk
Khas	One's own, private, also the property of Government (e.g., khas mahal Government estate)
Khasra	Drift (in rough) field statement
Khat	Abbreviation of khatian
Kh tak	Debtor
Khatin	Record of rights
Khet	Field
khet bant	11 lb field
Khetwat	The khatian of a proprietor or tenureholder
Khu	Personally, homestead land (Rajshahi)
Khud	Small
khush dakhil	Permissive possession (Mymensingh)
Kulabandi	See 'Pargana'
Kum	Description kind
Kumat	Village
kut	Instalment of rent or revenue
Kutibandi	Payment by instalments
Kutwar	Cadastral survey
kuta	plot
kul	an arm of a river either connected with or separated from the main channel
Kol raiyat	Under raiyat
Korfa raiyat	Ditto
Kreta	Vendee
Lak patit	Culturable fallow
Lagga	Measuring rod
Lakharaj	Land held revenue free
Lakhar jir	Revenue-free proprietor
Lapta pawasti	Accretion
Lath, nal	Measuring rod
Mablag	Total amount or sum of
Mahya swatwa	Tenure (lit rally intermediate right)
Mahyaswatwadhikari	Tenureholder
Mahatrin	Land given for a religious purpose, a kind of rent free granted to a non Brahmin
Mahakup (pr Mahakuf)	Remission (Minajore)
Mahal	Rate
Mai 'cess'	Including cess

Vernacular	English
Fan hary	Betel garden
Panchaki	Quit rent fixed in perpetuity (Midnapore)
Piraj aransa	Proportionate share individual share of diff rent people among themselves
I ureha	Copy of preliminary khatian given at oujharat
I uriman	Area
Parkha	Incomplete rent receipt
I urt l	Check line check
Pat t	Waste land
Patitah d	Reclaimed land
P'tri	A flat ruler
I utt i	Lease.
Pattan	Settlement lease.
Ping	Abbreviation for p'sar i son of
I urp u	Endowment in the name of a Muba mmalin saint
Pray i	Tenant a produce paying tenant (Jalpai guri)
Pray bil	Held by tenants
I rath i	Custom
Pur atan patit	Old fallow
I abi	Spri g crops
Rakkhik chitra	Tenure tree
Rajewa	Revenue
Rakm	Ches.
Pakba	Area
Ras i ya	Proportionate.
Ras d	Rent receipt.
Rihai	Exemption
Rihan	Mortgage
I ur w	Custom
Ruk i	Incomplete rent receipt
Poznimeh i	Diary
Ruh k r Pubak'ri	Written proceedings
Pup , Ropa Ropan	Transplanted
t i k	Oil
Sabik hal	Index of old and new khatian numbers (1st Bengal)
Sa hr jamā	Revenue

Vernacular	English.
Sadharaner byabakirya	Used by the public
Saham	Share, allotment in partition)
Sahari	Medium arable land (Jalpaiguri)
Sahi muhr	Sealed and signed (certified)
Sakin	President of
Saham	Premium for recognizing a transfer, etc
Sali	Rice land (West Bengal)
Sahana	Receipt, yearly
Shamil jama	Joint rent
Sanad	A deed of grant.
Sanayat patit	Oil fallow
Sarya	Produce rent
San katari	A kind of settlement for a seasons crop (Rajshahi)
Saradari	An ordinary riyati holding (Rajshahi)
Saru jama	Quit rent (Rajshahi)
Sahmahai	Six monthly (rent)
Sebat	Priest who arranges for the worship of a deity and manages the endowment.
Sarba mot	Grand total
Shenk	Co partner
Shikasti	Diluvated
Shikasti parwasti	Reformation
Sibottar	Rent free tenure Brahmottar
Sai	Arrange in due order
Sikal	Chain
Shikami (Shikmi)	Subor line. Auxiliary shikami line is the survey line from which offsets to field boundaries are taken
Sikami Taluk	A subordinate Taluk or Tenure
Simina	Boundary
Smazkhipi	Annals memorandum on the first page of Khissa volume for orders on doubtful points
Soin	Third class Used in classifying lands in unlabung country
Sreni	Tatus (Midiapore)
Stut	Aspects

Vernacular	English
Suchipatra (dager)	Index (plot)
Sud bandhak	Usufructuary mortgage
Sun	Uplands (West Bengal)
Swasthal parwasti	Performance <i>in situ</i>
Swatwa	Interest in land tenancy
Swatw adhikari	Owner of the interest
Taf ul	Table list
Targibi (pr takawi)	A kind of mortgage where the mortgagee pays half the produce of the land to the mortgagor but when the principal is paid the land goes back to the mortgagor
Tahsil	Collection
Taid ul	Statement filed under Regulations XIX and XXXVII of 1701 and VIII of 1800 claiming Lakshraj (Bilshahi or non Bilshahi) title
Talabina	Process fee
Talab biki	Account of demands and arrears
Talika	List
Taluk	Lat a 'subordinate' interest a tenure, in Jalpaiguri a territorial unit corresponding to the Revenue Survey mauza of other district
Tamil	Carrying out of an order
Tin	High land (Mymensingh)
Tanka	Produce rent
Tankhi	Survey of excess land (Pajshahi)
Taraf	Portion of an estate e.g. bara taraf chota taraf
Tarmim	Correction
Tartib	Arrangement of record
Tasdik	Attestation
Tek	High fallow land (Dacca)
Tengar	Hillcock
Thana 'number'	Serial number of a village in a thana
Thuka barga	See draki
Thuka mukarrari	Pen ^y fixed in perpetuity for a thaka of land let out without <i>mica namer</i> (Mylapore)
Uchhed	Ejectment

Vernacular	English
Udbastu	Lands adjoining homesteads and locally known as such
Upri-tha (swatwa)	Superior (or landlord's interest)
Utsarga	A rent free grant
Yad dushit	Memorandum
Zabita	Authenticated certified
Zamindar	Proprietor
Zauya	Wife of
Zer	Continuation
Zamma	In the custody of
Zirast	Proprietor a private lands

Latin words and Phrases.

Ab initio—From the beginning *Alias*—Otherwise *Amicus Curie*—Friend of the Court, who informs the Court when doubtful or mistaken of any fact or decided case *Animus*—An intent, *animo*, with an intent

Capax doli—Capable of committing crime *Compos mentis*—Of a sound mind *Curia advisari vult*—A deliberation which a Court sometimes takes where there is any point of difficulty before it gives judgment in a case

De die in diem—From day to day *De facto*—In fact opposite to *de jure*, of right *De jure*—By right *De minimis non curat lex*—The law cares not about trifles *De novo*—A fresh *Dies non*—A day on which Judges do not sit *Doli incapax*—Incapable of committing crime

Encientis—With child *En masse*—In a body *En route*—On the way *En suite*—In company *Ex cathedra*—With the weight of one in authority *Ex Curia*—Out of Court *Exempli gratia*—For the purpose of example *Ex necessitate legis*—From the necessity of law *Ex officio*—Officially, by virtue of office *Ex parte*—A proceeding by one party in the absence of the other *Ex post facto (jure)*—From a law made after the thing prohibited was done *Extra vires*—Beyond powers

Feme—A woman *Feme covert*—A married woman *Feme sole*—An unmarried woman *Fœticide*—Criminal abortion *Fœtus*—A babe in the womb *Forum*—A Court the Court to the jurisdiction of which a party is liable *Forum competentis*—The Court having jurisdiction over the matter, *Forum incompetentis*—A Court not having such jurisdiction

Gratis dictum—A voluntary statement *Homicide per infortunium*—By misfortune, where a man doing a lawful act without any intention of hurt unfortunately kills another *Homicide se defendendo*—Where a man kills another upon a sudden affray merely in his own defence, or in defence of his relations and not from any vindictive motive

Ignorantia facti excusat ignorantia juris non excusat—Ignorance of the fact excuses ignorance of the law excuses not *Incapax doli*—See *Doli incapax* *In extenso*—From beginning to end at full length *In extremis*—At the last gasp, at the point of death *Infra*—Below *In loco parentis*—In the place of a parent *In pleno lumine*—In the light of day, in public *In posse*—In a state of possibility *See In esse* *In re*—In the matter of *In situ quo*—In the condition in which it was, in the former state *Inter alia*—Amongst other things *Inter se*—Among themselves *In toto*—Altogether, entirely *Ipsa dixit*—He himself said it a bare assertion resting on the authority of an individual, dogmatism *Ipsa facto*—By the very fact itself *In part*—In part *In esse*—Actually existing

Kleptomania—Insanity in the form of an irresistible propensity to steal

Lex—Law **Lex apostata**—A thing contrary to law. **Lex fori**—The law of the place of action **Lex loci**—The law of the place **Locus in quo**—The place in which **Locus penitentiae**—A place or chance of repentance **Locus regit actum**—The place governs the act, that is the act is governed by the law of the place where it is done **Locus standi**—The right of the party to appear and be heard on a question before any tribunal

Mala in se—Acts which are wrong in themselves whether prohibited by human laws or not as distinguished from *mala prohibita* as Murder and perjury **Mala prohibita** Wrongs which are prohibited by human law, but are not necessarily *mala in se*, or wrongs in themselves, as in playing at unlawful games &c. **Modus operandi**—Manner of operation **Mutatis mutandis**—With necessary changes in points of detail

Nemo debet bis puniri pro uno delicto—No one ought to be punished twice for the same offence **Nemo debet bis vexari pro una et eadem causa**—No man ought to be twice put to trouble for one and the same cause **Nemo presumitur malus**—No one is presumed to be bad **Ne plus ultra**—Nothing further, the uttermost point **Nolle prosequi**—To be unwilling to prosecute **Non compos mentis** Not of sound mind **Non culpa nisi mens sit rea**—There is no guilt unless there be a guilty intent on **Nonfeasance**—The offence of omission **Notus homo**—pardoned criminal

Obiter dictum—An opinion of a Judge not necessary to the judgment given on record, in contradistinction to a *judicial dictum* which is necessary to the judgment The latter is of such greater authority than the former, because delivered upon deliberation, while an extra judicial opinion is no more than the saying of him who gives a *graves dictum*

Pari passu—by the same gradation equally, without preference **Per contra**—Contrarywise **Per curiam** By the Court **Per incuriam**—through want of care **Per infirmum**—By mischance **Post diem**—After the day **Post mortem**—After death as a post mortem examination of a corpse by a surgeon in order to discover the cause of death **Premium mobile**—The source of motion **Pro forma**—As a matter of form **Pro tempore**—For the time being

Qua—In the character of —

Res gestae—The things done and words spoken in the course of a transaction The phrase is commonly used in connection with evidence and the admissibility in evidence of words spoken

Semble Lit It seems, used in reports to show that a point is not decided directly but may be inferred from the direction **Semper idem**—Always the same **Scrutim**—Severally and in order **Sine die**—Indefinitely without a day being fixed **Sine qua non**—An indispensable condition **Statu quo**—The state in which the existing state of things any given date, **Sub judice**—Under consideration **Sui generis**—Of its

kind *Suo motu*—Of one's own motion *Supra*—Above This word occurring by itself in a book refers the reader to a previous part of the book like ante as opposed to *infra*

Ultra vires—Beyond power

Venue—The place whence the jury are to come for trial of causes, jurisdiction *Vexata questio*—In undetermined point *Viz*—Any kind of force or violence to person or property *Viz major*—Inevitable accident, irresistible force

MISCELLANEOUS FORMS

Application of Bail

In the Court of the Magistrate of Sealdah
In the matter of the application for bail and
In the matter of Emperor

Versus

Kanai Ghakur and others Accused

Secs 400 and 401 I P C

The humble petition on behalf of the
accused Nagendranath Chuckerbatty

Most Respectfully Sheweth —

1 That your petitioner was arrested on the 5th of August, 1923 by Inspector Hem Chandra Lahiri and he is still kept in custody in spite of repeated oral prayers made on his behalf for enlarging him on bail

2 That at the time of your petitioner's arrest a thorough search of the house in which your petitioner resided was made by the said Inspector Hem Chandra Lahiri but nothing suspicious or incriminating was found

3 That your petitioner is a family man having his wife and mother and that they all along lived with a respectable relation of theirs and that your petitioner has got no previous conviction

4 That your petitioner is a motor mechanic and a driver and holds good certificates of character from various European and Indian gentlemen whom your petitioner has served for ten years and who have all been satisfied with the discharge of his duties

5 That your petitioner is now in custody

6 That your petitioner is in very weak state of health in the lock up and he thrice fell in a swoon without having anybody to look after him and after this an application was made to the police for bail but the same was refused

7 That your petitioner is ready and willing to furnish substantial security

Your petitioner therefore

prays that he may be enlarged on bail

As your petitioner is in duty bound, shall ever pray

Application for maintenance

Case No Mr 1501 of 1925 Sec E Town

In the Court of the Addl Chief Presy Magistrate N D Calcutta
Zamala Khatum vs. Ek Sobraty

An application under section 125 Cr P Code

The humble petition of Zamala Khatum above named most respectfully sheweth — That your humble petitioner is the legally married wife of the defendant who earns more than 40 Rs per month That since after marriage the defendant lived within your honour's jurisdiction and used to molest and assault your humble petitioner after being drunk That at last the defendant had driven away your humble petitioner about six months ago and since then has refused to maintain his wife though he has sufficient means to maintain her Besides the defendant molests the complainant whenever they met and that defendant being a man of loose character follows and chastises his wife where she goes and takes shelter Under the circumstances your humble petitioner prays for notice upon the defendant to show cause why he should not maintain his wife Complainant's marks N Calcutta Sd/- Header 21825

Application for revision before a Sessions Judge

In the Court of the Sessions Judge of Darjeeling

In the matter of an application for revision

The humble petition of Lachmin Dass
Puranchand of Baman Bustee Darjeeling

Most respectfully sheweth

1 That the petitioners are a firm of merchants carrying on business in Darjeeling Bikkim Tibet carrying on military contract works and have house property of their own

2 That the petitioners are the owners of holding No 5 Baman Bustee near Darjeeling Bazar which consists of seven blocks and which stands in the Zamindari of Burdwan Ry covering 52 poles and these buildings were in existence from long before the Darjeeling Municipal Act, 1900, came into operation

3 That the Darjeeling Municipality requisitioned the petitioner on 17.1.1925 to carry out certain works of improvement to the said holding No 5 which the petitioners took up in right earnest but the requisition also consisted in the demolition of all the latrines and the kitchen and bath room and the jerry of the block No III and the Municipality insisted on carrying them out at once and refused their prayer for time

4 That the Municipality turned a deaf ear to all their entreaties even in face of the fact that there is no public latrine within convenient distance of the house and started a case against them

5 That Mr N Sen M I I holding special powers delegated by

Deputy Commissioner, Darjeeling U/S 6 (S) of Act III of 1884 has been pleased to order on 22.27, that the holding is prohibited for the purposes of human habitation with effect from 14.2.27 U/S 244 X of the Bengal Municipal Act as amended in its application to Darjeeling by Act I of 1900

7 Being aggrieved by the aforesaid order, the petitioners beg leave to move Your Honour on the following amongst other grounds -

Grounds —

(a) For that the learned Magistrate has erred in law in taking for granted that section 244 X of the Bengal Municipal Act as applied to Darjeeling is applicable to buildings in existence before the section came into operation on the 7th March 1900 having got retrospective effect

(b) For that the learned Magistrate did not give due consideration to the general principle of Equity as laid down in the several ruling that a retrospective operation is not to be given to a statute lest it may impair existing rights and obligations

Your petitioners therefore pray that your honour may be pleased to call for the records of the case and to issue a Rule on the Deputy Commissioner of Darjeeling to show cause why the matter should not be reported to the Hon'ble High Court under S 433 Cr P C for the quashing of conviction

And your petitioners as in duty bound shall ever pray.

Applications for revision before the District Magistrate

In the court of the District Magistrate of Khulna

Petition for reference to the Hon'ble High Court under section 433 Cr P C

The humble petition of Nepal Chandra Basu son of Beni Madhab Basu of village Ahainapore P & Bagerhat, District Khulna Most Respectfully Sheweth —

That your honours humble petitioner purchased some lands from Mathura Nath Basu in an auction sale and from the time of the purchase your petitioner has been possessing the same at first by settling it with tenants and lately in khas possession

That in the recent settlement proceedings which have been finally published your petitioner has been recorded to be in khas possession of the lands which bear the plot number 119 in Parcha

That the accused being baffled in their endeavour to take settlement of the lands from your petitioner had at last taken the law into their own hands and on the 20th of May last accused Narendra Nath Ghose along with some other people trespassed on your petitioner's land and began to erect a hut therein

That your petitioner tried to oppose them but was driven away with threats of violence

That therefore your honour's petitioner lodged a complaint before the S D O of Ragerhat who summoned the accused after an enquiry by the president of the local panchayet who reported the occurrence to be true and found possession of the land with your petitioner

That the case was thereafter made over to the file of the Sub Deputy Magistrate Mr M N Chowdhury who after examining the witnesses have been pleased to acquit the accused by his Judgment dated 4 9 28

That being aggrieved by the said order of acquittal your honour's petitioner begs to file this petition before your Honour and prays that your Honour will be pleased to call for the records of the case under sec 43 Cr P C and on perusing the same send up the records to the Honble High Court under section 438 Cr P C with a recommendation that the order of acquittal be set aside on the following amongst other grounds —

(i) For that the learned Magistrate did not write out the Judgment according to the provisions laid down in Sec 167 Cr P Code

(ii) For that the learned Magistrate has not at all mentioned anything about the finally published parcha which according to law raises a very strong presumption of possession

(iii) For that the learned Magistrate was wrong in stating that because no dakhil has been produced by the complainant with regard to the land to prove his settlement with tenants it is conclusive that your petitioner has no possession

(iv) For that the learned Magistrate was wrong in holding that because the accused is a co sharer of the previous owner of the land with regard to the properties he must have been in possession of the disputed land

Your honour's petitioner therefore prays that your honour will be pleased to make the recommendation as prayed above

And for this your honour's petitioner as in duty bound shall ever pray

Petition of appeal before Sessions Judge

In the Court of the Sessions Judge at Darjeeling

In the matter of a petition of appeal and in the matter of

Surbhadur Lama Convict

Appellant

vs

Mani shadur Limbu Complainant

The humble petition of Surbhadur Lama

accused and convicted under section 420

1 P C the appellant in this case.

Most respectfully Sheweth —

1 That the complainant in this case wanted to have a gun, approve the petitioner who is a pleader's clerk to try for a license and a

him. And it was settled that the complainant would pay Rs 50/- before and Rs. 50/- more after the transaction was complete,

2 That as instructed by the complainant, the petitioner wrote out the petition for the license for the gun and filed it with the Deputy Commissioner, Darjeeling for favour of granting the license. The complainant paid Rs 50/- in instalments to the petitioner as mutually agreed upon as his remuneration.

3 That the petition for the license was ultimately rejected by the learned Deputy Commissioner on the 7th October 1925.

4 That the complainant thereafter wanted the petitioner to refund the said sum of Rs 50/- which however the petitioner declined to do as it has been paid to him by way of remuneration for his troubles.

5 That the case was of purely civil nature but the learned Hony Magistrate was pleased to hold the petitioner criminally liable under section 470 I P C which is not warranted by law and sentenced him to undergo 3 months R I and to pay fine of Rs 50/ and in default, to undergo 3 months R I in addition.

6 That the petitioner being aggrieved by this conviction and sentence begs to prefer this appeal to Your Honour and prays that the record of the lower court may be kindly called for and after hearing the petitioner Your Honour may be pleased to set aside the conviction and sentence on the following amongst other grounds, and pending the decision of this appeal the petitioner may be kindly released on bail.

Grounds —

- (1) For that the case was wholly misconceived by the learned magistrate.
- (2) For that the case is nothing but of purely civil nature for which no criminal liability could be saddled on the petitioner.
- (3) For that learned magistrate was wrong in holding that the petitioner had committed an offence under section 470 I P C as the prosecution has wholly failed to prove an intention on the part of the petitioner to deceive the complainant at the time of receiving the money from him.
- (4) For that the weight of the evidence is against the prosecution.
- (5) For that in course of the trial the complainant was twice examined to fill up gaps in the prosecution evidence which was objected to by the petitioner but the objection was overruled by the learned magistrate.
- (6) For that the trial of the case was in camera in the private office of the Hony Magistrate far off from the court-chamber buildings and the petitioner was very much handicapped in his defence. For that the sentence is at least too severe.

Petition of appeal before the High Court.

In the High Court of Judicature at Port William in Bengal
Criminal Appellate Jurisdiction

In the matter of a petition of Appeal of
Banku Behari Bose Accused Appellant,

Verus

King Emperor

To

The Honble Sir George Claus Hankin Kt Chief Justice and his
companion Justices of the said Honble Court

The humble petition of the above-named appellant

Most Respectfully sheweth —

1 That the petitioner has been in possession of a plot of land
from the time of his father and has been enjoying and possessing the
same *over 25 years*

2 That the petitioner settled the said land with a tenant *Babu
Narendra Nath Ghosh who erected a hut there in the month of Jyestha,
1333 B S*

3 That when the said hut was erected by the petitioner's tenant
a criminal case was instituted by one Nepal Chandra Bose against the
petitioner and his said tenant Babu Narendra Nath Ghosh under sec
447 I P C and the case was tried by Mr M N Chowdhury Sub Dy
Magistrate of Bagerhat in the district of Khulna

4 That at the time of the trial of the said criminal case the peti-
tioners searched the box in which his father used to keep title-deeds
and rent receipts and other important papers and found in the box
an Amalnamah dated the *26th Poushayan 1307* and two rent receipts
of *1308 & 1309 B S* granted by *Nithura Nath Bose and others in
favour of the late Bibu Ambica Charan Bose* the father of the peti-
tioner and he filed them before the said Sub Dy Magistrate bonafide
believing them to be true and genuine

5 That the said Sub Dy Magistrate after taking evidence came
to the conclusion that the complainant was not in possession of the said
property and so acquitted the accused under Section 210 Criminal
Procedure Code

6 That the said Sub-Dy Magistrate did not discuss the question
of title based on the said Amalnamah and the rent receipts and the
documents did not in any way influence the said Sub Dy Magistrate
in acquitting the petitioner accused

7 That thereafter the complainant Nepal Chandra Bose made
application to the District Magistrate Khulna for referring the said
criminal case to the Honble High Court under Section 408 Cr P

Code which the petitioner submits that no such application lies against an order of acquittal

8 That the learned District Magistrate did not refer the case to the Honble High Court as was prayed for but granted sanction under Sec 476 Cr P C to prosecute the petitioner for committing an offence under Sec 471 I P C holding that the said Anilnama and rent receipts were forged though nothing was mentioned in the application before him by the complainant to that effect and though there was no evidence showing that the petitioner knew or had reason to believe at the time of their use that they were forged

9 That thereafter the said District Magistrate of Khulna lodged a formal complaint on the basis of which the present prosecution was started by Mr Amulya Krishna Dutta Magistrate 1st class Bagerhat who after inquiry committed the petitioner accused to the Court of Sessions Khulna

10 That the learned Sessions Judge Mr K K Sen tried the case with the assistance of a Jury and though he was doubtful if the prosecution had succeeded in making out that the accused knew or had reason to believe that the documents were forged he accepted the unanimous verdict of the Jury that the petitioner accused was guilty under Sections 467/471 I P C and on the 23rd day of April 1927 convicted and sentenced your petitioner to undergo rigorous imprisonment for one year

11 That being aggrieved by the said conviction and sentence your petitioner begs to prefer this petition of appeal on the following amongst other

Grounds —

I For that the *Sanction of the District Magistrate is irregular and illegal*

II For that there being no evidence to the effect that the accused knew or had reason to believe at the time of the use that the documents were forged the conviction is bad in law

III For that the learned sessions Judge misdirected the Jury when he said that the question referred to in ground No II is a question of fact

IV For that the sentence is at least too severe

The petitioner therefore prays that your Lordships may be pleased to admit the appeal and release your petitioner on bail pending the hearing of the appeal and after calling for the records and hearing your petitioner's lawyer set aside the conviction and sentence passed on the accused and to pass such further or other orders as to your Lordships may seem fit and proper

And your petitioner as in duty bound, shall ever pray

Application for revision before High Court

In the High Court of Judicature at Fort William in Bengal

Criminal Revisional Jurisdiction

In the matter of an application under section 439 of the Code of Criminal Procedure

And in the matter of

1 Jnanodh Kanti Trivedi,

2 Hanshi Toor,

3 Narsingha Bagdi,

4 Kahi Bagdi

Accused—

Petitioners

Versus

Purna Chandra Sinha Complainant

Of posse party

To

The Hon'ble Sir Nalin Ranjan Chatterjee Kt

Acting Chief Justice and his companion Justices of the said Hon'ble Court

The humble petition of the above-named accused persons

Most Respectfully Sheweth —

1 That some Lakhery properties belonged to one Nritvakali Das and one Manjari Das the wife and brother's wife respectively of one Trailokhyanath Ghose of village Rudrabati in the District of Murshidabad

2 That Road Cess of the said Lakhery properties fell into arrears and so a Road Cess certificate case No 140 1900 10 was instituted against the

said Nritvakali Das and Manjari Das and the Lakhery properties were sold through the Court to Babu Rajini Kanta Trivedi the father of the petitioner No 1 on the 16th May 1910 and he took delivery of possession of these properties through Court on the 20th November 1911

3 That on taking delivery of the properties the said Babu Rajini Kanta Trivedi was in peaceful possession of all the properties through tenants, who have been regularly paying rents to the said Rajini Babu

4 That one Netau Pal was the tenant of plot Nos 1 and 2 of the sale proclamation. Plot No 1 was 5 cottas and plot No 2 was also 5 cottas. The two plots bore a pama of Rs 2/ On the western part of plot No 2 there are two mango trees, so the said Netau abandoned the western half of plot No 2 as it was not suitable for rearing silkworm cocoons and he was given a reduction of Re 1/ from his rent. Thus the western half of plot No 2 was in the khas possession of Rajini Babu the father of the petitioner No 1 and he was possessing the land by taking the mango fruits etc. all along

5 That Purna Chandra Sinha, the opposite party complainant borrowed Rs 500/- from the said Rajani Kanta Trivedi by executing a handnote in his favour. On Purna's failure to pay off the debt Rajani Babu brought a civil suit against the said Purna in the Court of the 1st Munsiff Kandi, and got a decree for Rs 532/- with costs.

6 That on the prayer of the said judgment debtor Purna the Court ordered that the decretal amount should be paid by five equal annual instalments, the first instalment was to be paid in 1st Augoon 1329 B S and the 2nd instalment was to be paid in 1st Augoon 1330 B S and so on. The Court also ordered that the unpaid decretal amount should bear interest at 12 p c per annum.

7 That at the time of the payment of the 2nd instalment the judgment debtor did not deposit the interest along with the instalment amount so the decree holder Rajani Babu prayed for the execution of the entire decree as the judgment debtor made default in payment of interest.

8 That the judgment debtor the said Purna Chandra Sinha complainant preferred objection against the execution of the entire decree and the 1st Court granted his objection. Then Rajani Babu preferred an appeal against the said order of the 1st Court and that appeal was dismissed in March 1925 and the decree holder was directed to take the decretal amount by instalments.

9 That the complainant Purna Chandra Sinha thus elated at his success at the Civil Court intended to put the decree holder into trouble by bringing false criminal case against him.

10 That with the said intention the complainant filed a petition on 27th May 1925 before the Subdivisional Officer of Kandi, alleging that he was in possession of a piece of land (part of which is covered by the western half of plot No 2 which is in the khas possession of Rajani Babu) on which he raised a hut for storing rice and that on the 24th of May 1925, the said Rajani Kanta Trivedi gave order to his men to pull down the hut and that they pulled down the hut and carried its materials away.

11 That the said complainant Purna Chandra Sinha alleged that he purchased the disputed plot of 6 cottas along with another plot of 15 cottas from one Protap Chandra Roy for Rs 32 only in 1301 (1896). He alleged that there was a handnote of Rs 21 in favour of him executed by Protap Chandra Roy and that in order to pay off the dues of the handnote Protap executed that kobala. It further transpired that Trailokhynath (whose the husband of Nityakali Das, mortgaged the said plot along with another plot of 15 cottas to the said Protap Chandra Roy alleging them to be his Lakheraj properties. That as a matter of fact the plot of 6 cottas is not his Lakheraj property, part of it was the Lakheraj of his wife's brother's wife Nityakali Das and Manjari Das respectively.

and the other plot of 15 cottas was the jote land of Trilokhya and the Lakhrajdar of it were Keshub Chandra Dutt and Siroda Sundari Dasi.

12 The said Protap Chandra Roy brought a mortgage suit got decree and execution of the decree sold the mortgaged properties and purchased them himself in 1897. But he was never in possession of the properties.

13. That after the purchase of Purna Chandra Sinha from Protap, Lakhrajdar the plot of 15 cottas brought a suit being T S No 130 of 1905 against the said Purna Chandra Sinha for a declaration that the plot belongs to them as Lakhrajdar and that the handnote and kobala were not genuine and were collusive.

14 That the 1st Court gave a decree to the plaintiffs in that suit and declared both the handnote and kobala to be got up deeds there being no consideration for them. That the appellate Court also found them to be collusive deeds in 1901.

15 That on the complaint of Purna Chandra Sinha mentioned in para 10 above, the Sub Divisional Officer of Kandi summoned the petitioners and one Hrishu Kish Trivedi under Section 147 I P C and the accused were tried by Mr A K. Narajni Islam, Sub Deputy Magistrate who found them guilty and convicted and sentenced them to pay fines. The petitioner No 1 was fined Rs 75 in default one month's rigorous imprisonment, the petitioner No 2 was fined Rs 20 in default 3 weeks' rigorous imprisonment. Hrishukesh was fined Rs 30 in default 2 weeks' rigorous imprisonment. The petitioners Nos 3 and 4 were fined Rs 10 each in default one week's rigorous imprisonment.

16 That the petitioners preferred an appeal to Mr W S Addie the Magistrate of Murshedabad. He acquitted accused Hrishukesh Trivedi but in respect of the other accused he did not interfere and dismissed the appeal in respect of them on the 4th of November 1925.

17 Thereafter the petitioners moved this Honble High Court and a rule was issued being Cr Pev No 1037 of 1925 and on the 16th February 1926 a Division Bench consisting of Justice C C Ghose and Mr Justice Dalal made the rule absolute and directed the appeal to be reheard by the Sessions Judge of Murshidabad.

18 That thereafter Mr A L. Bhabh the Sessions Judge of Murshidabad heard the appeal and dismissed it on the 29th June 1926.

Your petitioners being dissatisfied with the said conviction and sentence beg to move the petition on the following amongst other

Grounds -

I For that the judgment of the Court of appeal below is not in accordance with law.

II For that the learned Judge is wrong in law in not considering at all the alleged document of sale of the complainant on which the complainant based his possession.

III For that the learned Judge is wrong in law in not discussing the evidence as to the possession of the land

IV For that the courts below ought to have held that the case was one of civil dispute

V For that the Courts below have not considered the documentary evidence on behalf of the accused persons

VI For that the courts below are wrong in holding that the judgment of the Civil Courts were not admissible in evidence

VII For that it ought to have been held that the petitioners had no unlawful common object.

Your petitioners therefore pray that your Lordships will be pleased to send for the records and issue a Rule calling upon the District Magistrate of Murshidabad and the complainant to show cause why the convictions of and sentences passed upon your petitioners should not be set aside or to pass such other or further orders as to your Lordships may seem fit and proper

And your petitioners, as in duty bound, shall ever pray

AFFIDAVIT

I, Nilkanta Das, son of late Nabin Chandra Das inhabitant of Manigram, Police Station Kandi, District Murshidabad, do hereby solemnly affirm and say as follows —

1 That I am karnamdar of the abovenamed petitioner No 1 and looked after the case in the Courts below

2 That the facts stated in the above petition are true to my knowledge.

Solemnly affirmed this the day of August 1925 before me I certify that I read over and explained the contents to the declarant and that the declarant seemed perfectly to understand them

Commissioner.

Application for Transfer under S 528 Cr P C

In the High Court of Judicature at Fort William in Bengal
Criminal Revision Jurisdiction

In the matter of an application under Section 526 of the Code of Criminal Procedure and in the matter of

Nilkanta Das karnamdar

Complainant—Petitioner

vs

1 Satish Chandra Ghosh

Accused

2 Lalit Mohan Sarkar ...

Opposit—Parties

To
 The Hon'ble Sir Lancelot Anderson Kt., K. C.,
 Chief Justice and his Companion Justices
 of the said Hon'ble Court
 The humble petition of the Complainant
 above named

Respectfully sheweth —

1. That your petitioner is the Secretary of the Singur Kayastha Samaj and as such filed a petition of complaint on 21.8.24 in the Court of the Sub Divisional Officer of Uluberia charging the said accused under Secs 406 and 420 I P C in respect of the money belonging to the said Samaj

2. That on the day the petition of complaint was filed the learned Sub Divisional Officer made an observation in open Court that the case was the result of a party feeling and to be in existence between the parties and thus imported his own personal knowledge into the matter and formed an opinion with regard to the case at the very earliest stage thereof

3. That on the same day the learned Sub Divisional Officer allowed Babu Haripada Bhattacharjee Mukherjee to make submission on behalf of the accused persons although that was objected to by Babu Bhagendra Nath Ganguli Vakil appearing for the complainant

4. That on the same day the learned Sub Divisional Officer refused to look into some documents which are to be used as evidence in the case against the accused persons after they were tendered by the complainant's said Vakil

5. That on the 21st day of August 1924 the learned Sub Divisional Officer passed the following order —

Let the complainant prove his case on 3.9.24

Thereafter your petitioner applied for subpoenas for the attendance of his witnesses and his application was rejected although his pleader undertook on the petitioner's behalf to pay all expenses to the witnesses as will be ordered by the Court on the next day of hearing

6. That the learned Sub Divisional Officer's order calling upon the petitioner to deposit Rs 100 as travelling allowances for Prosecution witnesses reached the petitioner late on 30th August 1924 and your petitioner on 1st September 1924 appeared in Court and deposited a cheque for Rs 100—on the Lloyds Bank as he had no time to cash and deposit the money in cash but the learned Sub Divisional Officer characterized it as merely a scrap of paper and your petitioner trying to explain the matter the learned Sub Divisional Officer silenced him saying keep quiet follow

7. That the accused No 1 is a member of the Udayagrampur Union Board nominated by the learned Sub Divisional Officer who also sent petitions of complaint to him for enquiry and report. The said acc

was also appointed as Polling officer by the Sub Divisional Officer in the in the last Council Election

8 That in connection with many affairs of the Local Board, Union Board and Thana Charitable Dispensary, your petitioner is not on very good terms with the learned Sub Divisional Officer

9. That the learned Sub Divisional officer recommended one Panchanan Chongilar for a membership in the Local Board in place of your petitioner who was the sitting member and some of the members of the Managing Committee of the Kayastha Samaj moved the District Magistrate of Howrah to set aside the learned Sub Divisional officer's recommendation with regard to the said Panchanan Chongilar

10 That one Brambrish Mondal clerk in the Local Board (who is also a clerk in Ulubaria Jail of which the Sub Divisional officer is the Superintendent) stands charged with receiving illegal gratification at the instance of your petitioner and his case is under decision by a Sub Committee of the said Local Board

11 That your petitioner on the 12th day of July 1921 complained against one Gopal Chandra Mondal, Vice-Resident Singti Union Board (who is also a member nominated by the learned Sub Divisional officer) to the Chairman District Board and he has been warned to mend his ways

12 That one Jatindra Nath Khan was a member of the Singti Thana Charitable Dispensary Committee nominated by learned Subdivisional officer and on the petitioner's motion he had to resign his post as a member of the said committee. The said Jatindra Nath Khan is also a member of the Singti Union Board nominated by the learned Sub Divisional officer and your petitioner also made complaints against him to the Divisional Commissioner and others for his removal therefrom

13 That your petitioner moved the District Magistrate of Howrah for the transfer of the above case under Section 525 Cr P C but the learned District Magistrate by his order dated the 20th day of September 1924, rejected the said petition

14 That your petitioner being aggrieved by the said order of the District Magistrate begs to move your Lordship on the following amongst other

Grounds

(1) For that under the facts and circumstances of the case as stated above the learned District Magistrate ought to have transferred the said case to some other competent Magistrate

Your petitioner therefore prays that your Lordship may be pleased to call for the records of the case and to issue a Rule upon the District Magistrate of Howrah

and upon the opposite parties to show cause why the aforesaid case should not be transferred to some other competent Magistrate within the District and to pass such other or further orders as to your Lordships may seem fit and proper and pending the hearing of this application further proceedings may be stayed

And your petitioner as in duty bound shall ever pray

Attest

I Bholanath Chaudhari son of Late Bibu Promotha Chaudhari by occupation landholder & merchant resident of 13 Bir Rajendra Poud do hereby solemnly affirm and say as follows —

1 That I am the petitioner and as such I am fully conversant with all the facts of the case

2 That the facts stated in the above petition are true to my knowledge

Prepared in my office

Signature

Vakil

Solemnly affirmed this the 29th day of September 1924 before me

Sd M S Abdul Rab

Commissioner

Petition of Appeal of the accused received from jail.

From Dina Bandhu Ura alias Thakur who was sentenced on the 31st September 1929 to death under section 302 IPC by the Addl Sessions Judge, 24 Parganas Alipore

Sheweth that your humble appellant is quite innocent in this case

That your poor appellant knows nothing about the charge of murder brought against him. About a year ago he kept a hotel. One woman Payabala by name used to serve in his hotel as a maid servant and she would do prostitution outside.

That about 5 or 6 months ago as the appellant incurred a loss he had to abolish the hotel and start working as a cool.

That the aforesaid Payabala used to come to the appellant and abuse him and even she would come to the place where the appellant worked and shower abuses on him and put a claim for her arrears pay. That after a few days the poor appellant gave up that job and started a small chop shop. That Payabala used to come to that shop and quarrel with the appellant is known to the people residing near by

That the humble appellant is innocent and knows nothing about the fact who was murdered by whom in Rajabala's house. That as Rajabala had grudge against the appellant she brought this charge against him

That the very day the murder was committed the Police went to the appellant's shop at 12 P M but as he was asleep they entered into his house and struck him with a lathi which caused a mark on his back After this they reported to the officer in charge of the thana that he got it when cutting a sind which is totally false

That when the Police arrested the appellant there was no blood stain on his body or cloth That the fact that after 15 or 16 days the police got his nails cut and the doctor stated in his evidence that there was blood stain in them was absolutely false

That the records of the case against the poor appellant may kindly be perused and prerogative of justice may be shown to him by acquitting him from this case and sparing his life

Left thumb impression of
Dinabandhu Uriya (alias Thakur)

Attested by

Sd H C Mitter,
Deputy Jailor

Countersigned

Sd Illegible

Magr I M S

Superintendent, Alipore Central Jail

Petition of appeal filed by an advocate

Dinabandhu Uriya (alias Thakur)

Appellant

Through

Hiralal Ganguli, Advocate

IN THE COURT OF JUDICATURE AT PORT WILLIAM IN BENGAL

Criminal Appellate Jurisdiction

Criminal Appeal No 609 of 1929

Dinabandhu Uriya (alias Thakur) Accused, Appellant (in Jail)

Versus

King Emperor

Under Secs 302 and 326 I P C

Petition of Appeal

The appellant above named being aggrieved by the judgment and order of S N Modak Esq I C S, Additional Sessions Judge of Alipur, dated 4th September 1929, convicting the appellant aforesaid in Jury trial No 10 of July Sessions for 1929 under sections 302 and 326 I P C and sentencing him to 4 years' R I to run so long as the sentence of death is confirmed by

this Hon'ble Court, is not executed, begs to prefer this petition of appeal to the Hon'ble Court on the following amongst other

Grounds

I For that having regard to the evidence on record and the facts and circumstances of the case the conviction of the accused under Sections 302 and 326 is bad and unsustainable

II For that the conviction and sentence of the accused is bad in law as well as on facts

III For that the learned Additional Sessions Judge was wrong in not explaining to the Jury the exceptions in section 300 I P C and in directing the Jury to the effect that the Jury need not consider any of the exceptions in the said section in the present case and the said omission and direction amounts to a material misdirection and the accused has been seriously prejudiced thereby

IV For that the learned Additional Sessions Judge was wrong in not drawing the attention of the Jury to the second part of Sec 304 I P C and in not explaining the same to the Jury with reference to the facts and circumstances of the case and the said omission amounts to a misdirection and has seriously prejudiced the accused

V For that while dealing with the alleged motive for commission of the present crime the learned Additional Sessions Judge was wrong in not explaining to the Jury the alleged previous circumstances from the point of view of the accused and the said omission has materially prejudiced the accused

VI For that the learned Additional Sessions Judge was wrong in not giving the jury any direction as to the exceptions in section 300 I P C having regard to the nature of the evidence and the facts and circumstances of the case

VII For that while dealing with the suggestion of alibi, and while directing the Jury that there was no evidence to prove the said suggestion of alibi the learned Additional Sessions Judge was wrong in not asking the Jury to draw adverse inference against the prosecution this point from non examination of Sindhu Bera as a prosecution witness although he was examined by P W 22 Sub Inspector Basanti Mukherji and was a material witness

VIII For that having regard to the discrepancies in material particulars among the P Ws the surrounding circumstances and probabilities of the case and the evidence on record the conviction of the accused under sections 302 and 376 I P C is unsustainable

IX For that having regard to the facts and circumstances of the case the sentence of death at any rate is too severe and is otherwise unsustainable

X For that the sentence passed upon the accused under s

and 326 I P C are too severe, having regard to the facts and circumstances of the case

And the appellant as in duty bound shall ever pray

List of papers—

This petition of appeal

Vakalatnam

1

-1

The copy of heads of charge to the Jury and the verdict and sentence may be dispensed with, this appeal being against sentence of death

Sd Hiralal Ganguli

Advocate for the appellant

IN THE HIGH COURT OF JUDICATURE AT PORT WILLIAM IN BENGAL

CRIMINAL APPELLATE JURISDICTION.

In the matter of an application
under section 419 Criminal Procedure Code

And

In the matter of Abdul Momin
Petitioner Accused

Versus

The King Emperor

And

In the matter of an order of Mr T J V Roxburgh, Chief Presidency Magistrate, Calcutta dated the 29th April 1930 convicting the petitioner under section 120B read with Section 117 and 147 I P C and sentencing him to undergo rigorous imprisonment for one year and under Section 117 read with Sections 143 and 147 I P C (but no separate sentence having been passed under the other sections) and an order to execute a bond of Rs 2000/- with two securities of Rs 1000/- each to keep the peace for 3 years, in default to suffer simple imprisonment for the same period

To

The Hon'ble Sir George Claus Rankin M A Kt Chief Justice and his Companion Justices of this Hon'ble Court

The humble petition of the
above named appellant

Most Respectfully Sheweth —

1 That your petitioner along with others was put upon his trial before Mr T Roxburgh Chief Presidency Magistrate, Calcutta under section 120B I P C read with sections 117 143, 147 I P C to wit conspiracy, to abet the commission of offence of rioting and causing the assault of public authorities

2 That the case of the Prosecution was as follows —

(a) That there were several meetings of the Carters' Union in Calcutta

(i) on 6th February 1930

(ii) on 16th February 1930

(iii) on the 23rd February 1930 and

(iv) 30th March 1930

that at the first meeting your petitioner only explained the utility of the said Union

(b) That at the other said meetings held in different parts of the town of Calcutta your petitioner made no speech but at the third meeting he only acted as Secretary and collected some subscriptions

(c) That pursuant to the resolutions passed at the meeting of the Carters Union Carters of Calcutta refused to pay fines on conviction in Criminal Courts and preferred to go to jail instead and on the 1st April 1930 took out their carts on the streets and during midday unyoked the buffaloes from the said carts and blocked the parts of Harrison Road near its junction with Strand Road with the said carts causing a serious dislocation of traffic That on the police authorities trying to remove the obstructions from the said road there was a serious clash between the Police and the said carters, so much that the police had to open fire

3 That your petitioner pleaded not guilty to the aforesaid charges and his defence was that at the first said meeting he only explained the utility of the Union to formulate grievances and that at the third meeting he acted as Secretary and collected subscriptions from the carters and that beyond helping the Union with advice regarding the ways and means of redressing the said grievances he had no part in the rioting of the 1st April 1930 That the aforesaid meetings were bonafide and also in the interest of the carters of Calcutta

4 That at the trial the Prosecution produced evidence in support of the charges framed against your petitioner but your petitioner submits that the only evidence so far as he is concerned brought on record by the Prosecution is to the effect that —

- (a) at a meeting of the Carter's Union held on the 9th February 1930 your petitioner only explained the utility of the Union
- (b) that at the third meeting he only acted as Secretary and collected subscriptions

5 That the learned Magistrate by his order dated the 28th April 1930 found your petitioner guilty under Section 117 read with Sections 143 and 147 I P C but passed no separate sentence but convicted your petitioner under Sections 120B read with Sections 117 and 147 I P C and sentenced him to undergo rigorous imprisonment for one year and to execute a bond of Rs 2 000/- with two securities of Rs 1 000/- each to keep the peace for 3 years in default to suffer simple imprisonment for the same period

6 That being aggrieved by the aforesaid order your petitioner begs to prefer this appeal in this Honble Court on the following amongst other

Grounds

I For that on the evidence on the record the elements necessary to constitute an offence under Section 120B read with sections 117 and 147 of the Indian Penal Code and an offence under Section 117 read with section 143 and 147 I P C have not been proved in the case

II For that the charges as framed are bad in law and the accused has been prejudiced at being tried on these charges

III For that the charges as drawn up in the case were vague and prolix and did not give the appellant a proper notice of what he had to meet

IV For that the common object charged of the alleged assembly did not constitute the said assembly unlawful within the meaning of Section 141 of the Indian Penal Code

V For that the learned Magistrate ought not to have placed any reliance upon the so-called reports Exhibits 5 2, 3 and 6

VI For that the circumstances under which the said reports were made demonstrated conclusively that they were not true and faithful reports of the speeches made at the meetings

VII For that the said reports being admitted based upon the recollection of the reporters who took no notes and who purported to jot down only such passages as they deemed to be important divorced from the context and the full text of the speeches not having been before the Court the conviction based on these reports is unwarranted and illegal

VIII For that the absence of any evidence to show or suggest that the petitioner made any speech instigating the carters to break the peace or do any unlawful act the convictions are unsustainable

IX For that the learned Magistrate is wrong in supposing that at any of the meetings at which the appellant was present he supported any action by the Carters leading to an offence under section 14 I P C

X For that the perusal of the entire reports of the meetings attended by the appellant makes it abundantly clear that no offence was committed by the appellant

XI For that the learned Magistrate has failed to notice that the conduct of the appellant after the rioting was incompatible with the allegation that he was a member of the conspiracy as charged

XII For that the learned Magistrate is wrong in holding that there was any conspiracy or inflammatory statements by the appellant in fact there is no evidence on the record to support that statement

XIII For that there is no evidence on the record to prove that the appellant at any time instigated the movement to cause obstruction to the Public Streets or that he entered into any conspiracy to do the same

XIV For that no foundation having been laid in the evidence for holding that there was any conspiracy between the different accused persons the learned Magistrate has erred in law in admitting in evidence against the appellant the words and actions of the other accused persons

XV For that the learned Magistrate is wrong in law as well as in fact in holding those who intentionally brought about the situation on the 1st April must be presumed to have intended that there should be these assaults on the Police

XVI For that in the absence of any evidence to show that the accused at any time instigated or even anticipated the use of force by any member of the assembly the learned Magistrate is wrong in holding that the charge under Section 10B read with sections 117 and 147 I P C has been made out

XVII For that the learned Magistrate ought to have found that the appellant either instigated or combined with other persons to instigate the use of criminal force for the action of the Carters on the 1st April before he could convict him of the offence charged

XVIII For that the meeting per se being held publicly and openly for the redress of grievances in furtherance of the formation of a trade union and there being no finding as to the active suggestion or support or simulation by the appellant of the happenings of the 1st April conviction is bad in law

XIX For that at any rate the sentence is much too severe

XX For that the order under section 106 Cr P C is not warranted in the circumstances of the case

And your petitioner prays your Lordship may be pleased to call for the records of the case and admit this appeal and direct the petitioner to be released on bail pending the appeal

And your petitioner as in duty bound shall ever pray

**IN THE HIGH COURT OF JUDICATURE AT FORT
WILLIAM IN BENGAL
CRIMINAL APPELLATE JURISDICTION.**

In the matter of an application
under section 419 Criminal Proceed-
ure Code

And

In the matter of Bankim Ch
Mukherjee Accused Petitioner

Versus

The King Emperor

And

In the matter of an order of Mr
T J Y Roxburgh Chief Presidency
Magistrate Calcutta dated the 29th
April 1930 convicting the petitioner
under section 100B read with Sec-
tions 117 and 147 I P C and
sentencing him to undergo rigorous
imprisonment for one year and to
execute a bond of Rs 2000 with
two sureties of Rs 1000 each to
keep the peace for 3 years in default
to suffer simple imprisonment for
the same period

To

The Hon ble Sir George Claus Rankin Lt Chief Justice and his
companion Justices of this Hon ble Court

The humble petition of the
appellant abovenamed most respect-
fully

SHEWETH

1 That your petitioner is the President of the carters Union a body
formed for the protection of the interest of the carters and Chowdhurys
plying their carts in the city of Calcutta

2 That your petitioner along with others was put on his trial before
Mr T Roxburgh Chief Presidency Magistrate Calcutta under section
100B I P C read with Sections 117 and 143 and 147 I P C to wit
conspiracy to abet the commission of offence of rioting and causing the
assault of public authorities

3 That the case for the prosecution inter alia was as follows —

(a) That there were several meetings of the Carters Union in
Calcutta viz (1) on the 9th February 1930 (2) On 16th February

1930, (3) On 23rd February 1930 and (4) On 30th March 1930 That the first meeting of the Union was presided over by your petitioner

- (b) That at the said meetings which were held in different parts of the town of Calcutta many carters and Chowdhurys were present That in the first meeting your petitioner was appointed as Chairman of the Carters' Union and in thanking the meeting said that the Carters must hold meetings in different parts for propaganda
- (c) That pursuant to the resolutions passed at these meetings of the Carters Union Carters of Calcutta refused to pay fines on conviction in Criminal Courts and elected to go to jail instead and on the 1st of April last took out their carts on the streets and during midday unyoked the buffaloes from the said carts and blocked the part of Harrison Road near its junction with Strand Road with the said carts causing a serious dislocation of traffic That on the police authorities trying to remove the obstructions from the said road there was a serious clash between the Police and the said carters and so much so that the Police had to open fire

4 That your petitioner pleaded not guilty to the aforesaid charges and his defence was that beyond presiding at one public meeting of the Carters held to discuss their grievances and beyond helping the Union with advice regarding the ways and means of redressing the said grievances he had no part in the rioting of the 1st April last That the aforesaid activities of your petitioner were bonafide public activities in the interest of the Carters of Calcutta

5 That at the trial the prosecution led evidence in support of the charges framed against your petitioner but your petitioner submits that the only evidence so far as he is concerned brought on record by the prosecution is to the effect that —

- (a) at a meeting of the Carters Union held on the 9th February 1930 your petitioner was appointed as the Chairman of the newly formed Carters' Union
- (b) that your petitioner was present at the said meeting and made a speech asking the carters to hold meetings in different parts of the town for propaganda
- (c) that your petitioner was on one occasion present at the Bankshall Police Chowki when the case instituted by I. S. P. C. A against the carters were going on

6 That the learned Magistrate Mr Roxburgh however, by his order dated the 20th April 1930 found your petitioner not guilty under section 117 read with Section 147 I. P. C. and acquitted him of the charge but convicted your petitioner of the offence under section 1-

with Sections 117 and 147 I P C and sentenced him to undergo rigorous imprisonment for one year and to execute a bond of Rs 2000 with two sureties of Rs 1000 each to keep the peace for 3 years in default to suffer simple imprisonment for the same period

7 That being aggrieved by the aforesaid order your petitioner begs to prefer this appeal in this Hon ble Court on the following amongst other

Grounds

1 For that on the evidence on the record the elements necessary to constitute an offence under section 120B read with sections 117 and 147 of the Indian Penal Code have not been proved in the case

2 For that the charges as framed are bad in law and the accused has been prejudiced at being tried on these charges

3 For that the charges as drawn up in the case were vague and prolix and did not give the appellant a proper notice of what he had to meet

4 For that the common object charged of the alleged assembly did not constitute the said assembly unlawful within the meaning of section 141 of the Indian Penal Code

5 For that the learned Magistrate ought not to have placed any reliance upon the so called reports Exhibits 1, 2, 3 5 and 6

6 For that the circumstances under which the said report were made demonstrated conclusively that they were not true and faithful reports of the speeches made at the meetings

7 For that the said reports being admittedly based upon the recollection of the reporters, who took no notes and who purported to jot down only such passages as they deemed to be important divorced from the context and the full text of the speeches not having been before the court the conviction based on these reports is unwarranted and illegal

8. That in the absence of any evidence to show or suggest that the petitioner made speeches instigating the Carters to break the peace or do any unlawful act the convictions are unsustainable

9 For that the learned Magistrate is wrong in supposing that any of the meetings at which the appellant was present he supported any action by the carters leading to an offence under section 147 I P C

10 For that the perusal of the entire reports of the meetings attended by the appellant makes it abundantly clear that no offence was committed by the appellant

11 For that the learned Magistrate has failed to notice that the conduct of the appellant after the rioting was incompatible with the allegation that he was a member of the conspiracy as charged

12 For that the learned Magistrate is wrong in holding that there was a conspiracy or inflammatory statements by the appellant, in fact there is no evidence on the record to support that statement

13 For that there is no evidence on the record to prove that the appellant at any time instigated the movement to cause obstruction to the public Streets or that he entered into any conspiracy to do the same

14 For that no foundation having been laid in the evidence for holding that there was any conspiracy between the different accused persons the learned Magistrate has erred in law in admitting in evidence against the appellant the words and actions of the other accused persons

15 For that the learned Magistrate is wrong in law as well as in fact in holding those who intentionally brought about the situation on the 1st April must be presumed to have intended that there should be these assaults on the police

16 For that in the absence of any evidence to show that the accused at any time instigated or even anticipated the use of force by any member of the assembly the learned Magistrate is wrong in holding that the charge under section 120B read with Sections 117 and 147 I P C has been made out

17 For that the learned Magistrate ought to have found that the appellant either instigated or combined with other persons to instigate the use of criminal force for the action of the Carters on the 1st April before he could convict him of the offences charged

18 For that the meeting just being held publicly and openly for the redress of grievances in furtherance of the formation of a trade union and there being no foundation to the grave suggestion or support or stimulation by the appellant of the happenings of the 1st April the conviction is bad in law

19 For that at any rate the sentence is much too severe

20 For that the order under section 106 Cr P C is not warranted in the circumstances of the case

And your petitioner prays your Lordships may be pleased to call for the records of the case and admit this appeal and direct the petitioner to be released on bail pending the hearing of the appeal

And your petitioner as in duty bound shall ever pray

IN THE HIGH COURT OF JUDICATURE AT FOOT
WILLIAM IN BENGAL
CRIMINAL REVISIONAL JURISDICTION

IN THE MATTER OF APPLIC-
CATION Under Section 429 of the
Code of Criminal Procedure and

IN THE MATTER OF LADHU
RAM SONAR

Accused Petitioner

Versus

KALURAM AGARWALLA.

Complt. Opposite party

To

The Hon'ble Sir George Chas Rankin Kt Chief Justice and His
Companion Justices of the said Hon'ble Court.

The humble petition of the above-
named petitioner most respectfully

Sheweth —

1 That your petitioner has been convicted by Mr H K De Fourth
Presidency Magistrate Calcutta under section 100 of the Indian Penal
Code and sentenced to pay a fine of Rs 200/- in default two months
rigorous imprisonment and the fine if paid will be paid to complainant as
compensation

2 That the accused belongs to Joypore within the Native States and
he was brought down to Calcutta under an extradition warrant on the
allegation that the complainant Kaluram Agarwalla entrusted the accused
with 3½ Bhurras and 7½ annas Weight of gold on one day and a further
quantity of three bhurras and twelve annas on a subsequent day for
preparing ornaments on account of his marriage

3 That on the twenty fifth day of January 1930 complainant filed
the petition before the Additional Chief Presidency Magistrate for process
against the accused, whereupon the learned Magistrate examined the
complainant and ordered D town police to enquire and report by the 10th
of February 1930

4 That on the 7th of February 1930 the Police made a report saying
that the accused could not be found

5 That on the tenth day of February one thousand nine hundred and
thirty the case was adjourned to the twenty seventh day of February 1930
and on the latter date the complainant was absent and the petition of
complaint was dismissed under section 203 of the Criminal Procedure Code

6 That on the first day of March 1930 the complaint was revived and
adversely was adjourned to the seventh day of March 1930 on which date
certain witnesses were examined before the Additional Chief Presidency
Magistrate and the case was adjourned to the twenty fourth day of March
one thousand nine hundred and thirty On the 24th March the case was
again adjourned to the first April 1930 and on the first of April 1930 a
Warrant was issued against the accused under section 106 I P C making
it returnable on the sixteenth day of April one thousand nine hundred

7 That on the third day of April 1930 although that was not the date fixed for the next hearing of the case the following order —

Pai Haridhone Dutta Bahadur to kindly record the evidence and report as to issue of the extradition Warrant'

8 That thereafter certain evidence was recorded by Rai Bahadur Haridhone Dutt Honorary Magistrate Calcutta and on the tenth day of April one thousand nine hundred and thirty the said learned Honorary Presidency Magistrate recorded the following order —

Three more witnesses examined extradition against Ladhuram Soner only recommended Put up before the Additional Chief Presidency Magistrate

Ftc Ftc Etc

In the Court of the Sessions Judge Assam Valley Districts
(Criminal Appeal)

King Emperor Vs —1 Sewlochan Sing
2 Sew Katan Sing—Appellants
3 Sraban Sing
(Nos 1 & 2 convicted under
S 147 I P C and sentenced to
3 months rig Imp and a fine of
Rs 50 and No 3 sentenced to
undergo rig Imp for 4 months
and to a fine of Rs 50/ under
section 147 I P C)

The humble appellants abovesaid beg to prefer this appeal against the decision of Babu P N Das Esq A C and First Class Magistrate sentencing them as above on the following amongst other

Grounds

1 For that the learned Magistrate after finding in his Judgment that the Serang and his men first assaulted Sameswar which led to a mutual fight between the parties on the steamer erred in fact in not holding that the fight with brick bats and pellets was continuation of the first started by the khalasis and that they were the aggressors

2 For that the learned Magistrate erred in law in laying down the principle and acting upon the same in that if two witnesses identified the accused he was found guilty of rioting

3 For that the lower court erred in not taking into consideration the evidence of Mr Currie when he stated on oath that the coolies were barchanded whereas the khalasis had iron bars and also that when the coolies were going towards the bank the khalasis were throwing pellets from the bows of the steamer

4 For that the learned Magistrate ought to have held after finding that the khalasis were the aggressors that some sort of defensive

was necessary on the part of the coolies to stop the Khalasis from throwing missiles at them and if some of them threw missiles in defence to cover their retreat of the rest they did not exceed the right of Private defence

5 For that regarding Appellant No 1 Sew Lochan there were the evidence of only two witnesses viz P Ws 9 & 10, but the learned Magistrate committed a great error in not directing his attention towards the statement of witness No 9 Mofizal Khan before the identifying Magistrate wherein he clearly stated that Sew Lochan did not take any part in the row

6 For that witness No 10 Fuzlur Rahman also did not state in the identification parade that Sew Lochan threw stones

7 For that prosecution witnesses were examined in two batches and it was only the witnesses of the last batch examined on 13.11.26 (P Ws 9 & 10) incriminated appellant No 1

8 For that the learned Magistrate held your humble appellant Srihan Sing guilty mainly relying on the testimony of witnesses Nos 8 & 11 without considering the fact that these two witnesses were not presented at the identification parade and no satisfactory explanation had been given for this important omission and the learned Magistrate ought not to have found him guilty without sufficient corroboration from other sources

9 For that the above two witnesses were witnesses examined in the second batch and as such their testimony ought to have been taken with great caution

10 For that regarding No 2 viz Sew Ratan Sing the learned Magistrate relied on the evidence of only Motiur Rahman and Mr Havelock ignoring the fact that the former contradicted himself in his cross examination and the latter was not present at the time of the throwing of the missiles

11 For that in view of the fact that the other witness P W 2 Mr C C Havelock on whom the Magistrate has relied for convicting your humble appellant Sew Ratan was not named in the charge sheet and the fact that no other witness examined in court referred to him as being present at the time of occurrence read with the definite statement of P W 1 Mr R A Currie who said that Mr Havelock came when all was quiet and of P W 9 who said that Mr Havelock came when the steamer was in the mid stream for 10 or 15 minutes the learned Magistrate should not have placed any reliance on his testimony as being uncontroversial or safe

12 For that considering the fact that the trouble was started by the Khalasis in a cowardly way i.e. by first assaulting the coolies getting them inside their steamer the learned Magistrate should not have taken such a serious view of the second part of the occurrence despite of the unfortunate accident of having one man's leg injured in the affray

13 For that the learned Magistrate failed to take into consideration the fact that the witnesses who identified the present appellants saw them only for a second or two while in the alleged act of throwing stones amongst nearly 100 men and their identification could not be infallible without proper corroboration from reliable and independent sources.

14 For that under the circumstances the sentences are very severe

Under the above circumstances the humble appellants pray that the appeal may be admitted that the same may be heard after calling for the record and that the humble appellants may be released on bail For which act of kindness as in duty bound the appellants shall ever pray

(ASSAMESE)

In the Court of the extra Assistant Commissioner of Dibrugarh

Copy of petition dated 4.10.26 filed by Hen Ibum in case No 1146 C 26

জিলা পশ্চিমগুৰু নো ডিব্ৰুগড় যৌক্তিক আদালত। ইতি ৩/১০/২৬

কৈঃ নাম	আগামী	খায়া	তা	সংখ্যা
হীৰেন্দ্ৰ আৰু নিঃ চন্দ্ৰবালি গাও মৌজা জয়পুৰ	১। হীৰোগী আৰু ২। " তামুলি " ৩। " মংল " ৪। " তৰুণ " নিঃ কথা	মঃ বিঃ ৩২৪ ৪৪৭ খায়া	২ ২৩	১। হীৰুগ ২। কম্বিমাংবি ৩। উদা অংলী গবেহ

ধৰ্মাবতাৰ।

১নং আসামীৰ দাটী কৈবাসীৰ ঘৰৰ সন্মুখত আছে, অতঃপৰি কৈবাসীৰ শিক্ষক হীৰুগৰ মহাৰোই গুলি ঘৰলৈ উক্ত আসামীৰ দাটীৰে দি ঘৰৰে আসামীৰ নাম আসামীৰ শিক্ষক কুলুত গালি দিয়াত কৈবাসীয়েত কিয় গালি বিহু বুলি কোৱাত সি ৩২ নং আসামীক শিওৰ হ'ব কয় যে, মোক গালি পাৰিছ বুলি এই কথা কোৱাত ২নং আসামীৰ ঘৰত মাত্ৰ গুলি

কোৰাত তেতিয়া ২, ৩, ৪ নং আসামি হতে আহি অনধিকাৰ প্ৰবেশ ক্ৰমে বোক নামৰ পাৰাব পৰা খেদা মাৰি নি ২নং আসামিয়ে আগ ভেটি দুৱাৰ মুখেতে এনাৰ মাৰে তাৰ পাছত ১নং আসামিয়ে মাৰে তেনেতে ৩নং আসামিয়ে দাহেৰে বোৰ কপালত একুৰ মাৰে হাতৰ বুজা আঙ্গুলি দাহেৰে আঙ্গুলি ভাঙ্গে, তাৰ পাছত ৪নং আসামিয়ে ভৰিত একেৰে মাৰে, তেতিয়া মাত্ৰহে এবোৰাহি দিবে পুলিচত আহি শিৱাকণা থৈ থৰ দিয়াত পুলিচে ফৈৰাদিক হাসপতালত পঠায়ে, ২৭।১২৬ অৰিথলৈকে হাসপতালত আছিলো। এতিয়ালৈকে পুলিচে মোকদ্দমা চালান নিদিয়াত আৰ্থনা হে, পুলিচৰ কাগজ আদি উলৰ আনি কিচাৰ কৰি আসামী হেতক দণ্ড বিধানৰ আছা হয়।

স্বাক্ষৰ—

Sd/- মন।

(HINDI)

মুদৰ্ং	মুদালিহ	দফা—
হুজ: কা: মানবীৰ মুদ'ং	বাবু জুৰীমল মাৰবাৰী ১	আমজনা
খুৱচান টোন	বাবু নৰ্ম নৱাছন প্ৰধান	বাৰ্গামেঁ
	খুৱচান বাজাৰ	মাৰপীঠ
		কৰনা ২ বজী
		ঘাত ২৪।১১।২৫

জনাব আলী—ৰিপোৰ্টৰে অৱজ কৰতা হু' ওপৰ লিখা মুদালিহ দ্বীনো আদমো ছিলকাঠেঁ
 চৌহ তাৱাপুৰ কাম্বনী দোকানকী সামনে মাৰপীঠ ঘুচা ঘুচী লড়াই কৰতা হা হম জাকি হুটা
 দিয়া নীচে নগ নৱায়েল প্ৰধান মাগকী থানাৰে বৰফ অলা মীয়া বী জুদীমল মাৰবাৰী অপনা
 ঘৰম জাকি পিসতৌল লৈকৰ আয়া নী নগ নৱায়েল প্ৰধানকী মাৰিয়া বী হমসে মাৰিয়া বীপকী
 আনসে জুৰীমল মাৰবাৰী কী সমঝায়া বী পীচতৌল দিখনেসে কাডতৌস নহী থা বানী
 ৰিপোৰ্টৰে অৱজ কৰতা হু' ওপৰত কৰবাই অৱনকী হুজুৰমেঁ মৰজী হীবে অৱজ কিয়া ইথি।

সহী হু: মানবীৰ মুদ'ং ২৪।১১।২৫

অশাৰ্হ—মানবাছাদুৱ কবী খীকীদাৱ

খুৱচাথ ৱিলবে ইছ'সন (১)

কা নৱাছাদুৱ থাথা (২)

কা জমন বাছাদুৱ থাথা (৩) খুৱচান টোন

(BENGAL)

বন্দী	অসামী	সাক্ষী
ঈশপ সেনিদ্দীন মির্দে	১। বহিমবয় মির্দে	১। সমজত আলী মির্দে
স* ব*কুদহ	২। কহিমবয় মির্দে	২। বোদাবয় মির্দে
স*না বা*ন*ন	৩। আবদুল মালেক	৩। হরসাদ আলী মির্দে
	৪। বেহিদীন মির্দে	স* বাবুউদহ
	৫। আবদুলখালেক মির্দে	৬। গোলাম পাঞ্জা
	৬। আবদুল আজিজ মির্দে	৭। এশাই বয় সেথ
	স* বাবুউদহ	স* রানা
	৭। নোসিরদ্দীন মির্দে	৮। হেদারদ্দীন আকশ
	৮। আবদুলখোফুর মির্দে	স* পাইকপাড়া
দে*কদমা ৪৭ ৩২৫	৯। সেথ পালী বয়	৭। রেহাসতুলা
৩২৩ ৫০৪ ধারা	স* রানা	৮। ছেবিবেলহক মির্দে
	হা হাড়া আরও	৯। তপজাল হোসেন মির্দে
	১০ জন লস্টওয়াল ছিল	১০। গোলামরহমান মির্দে
		১১। ভূষণ সামন্ত

বিবরণ এই যে ১৯৮৩ খ্রিস্টাব্দে ১৫ ফেব্রুয়ারি বাঙ্গালা ২৬ মাঘ বুধবার সাং বাহুবল
সকল দেশ আন্দোলনকারী সমর আসামীগণ খানা বাগনাথ অবৈধ জনসভা মিলিত হওয়া কেহ
কেহ নাটী কেহ কেহ বোম্বল হস্তে আমাদের সকলসাধারণের করিব খানার জাগরণ আসিয়া
আমাকে সুবিস্তৃত ভাষায় গুলীগোলাজ করত ৭ন আসামীর হুম্ম ন আসামী লাটীর দ্বারা
আমার ডান হাতে মারিয়া বাঁ ডানিগা দিয়া গুল্লার জবন করিয়াছে ১ন আসামী লাটীর দ্বারা
আমার মাথার ৩ন আসামী লাটীর দ্বারা আমার বাম হাতের কবুয়ের উপর ৪ন আসামী
লাটীর দ্বারা আমার পৃষ্ঠ ৫ন আসামী লাটীর দ্বারা আমার বাম পাতে মারিয়া গুল্লার জবন
ও হস্তপাত বরিয়াছে। ১ন সাধী আমার ভাইপো বিখার হাড়াইতে বাওয়া ৬ন আসামী
লাটীর দ্বারা তাহার বাম হাতের কবুয়ের উপরে ৮ন আসামী লাটীর দ্বারা তামার বাম
হাতে ও ৯ন আসামী লাটীর দ্বারা তাহার বাম বোঁতাতে মারিয়া গুল্লার জবন করিয়াছে
আমাদের জবন বঙ্গবান সরকারী হাসপাতালের ডাক্তার বাবুর দ্বারা পরীক্ষা করা হয় যে
সামান্যকট পাইডাচি তামা অতঃসহ দাখিল করিলান গত কথ্য আমার ভবনের বঙ্গ দেয়
সংস্কৃত হুজুর নালিগ করিত পারি নাই। অসামান্যের কারণ এই যে অসামান্য প্রতিবার
নিবট আদালত ও বধ্য বণীহৃত লোক হইয়াছে ঘটনার বহুদূর সময় উক্ত জাহাজের উপর
আমাদের সাধারণের একটি ফকিরখানা ছিল উক্ত ফকিরখানার দর সৈয়দী করিবার চক্ক অত্র
২। ১২৫ দিন বাবং দেয়াল সিংহাসন ঘটনার সময় অসামান্য বঙ্গবান অসামান্য উক্ত

চুপাইয়া বিবাহ ভেটা কলার আনি আগন্তি কলিন সৰুৰ আসানীৰ পদুলাৰ একোটা টুকুৰা
অপাৰ কৰিছিল। অৱৈ আৰ্থনা টুৰ খাৱাৰ আসানীৰ লগে বিচাৰ কৰি
অপাৰ।

নিবন্ধন ইং—২/২/৩৩

বাৰি হেনিৰদীন নিৰ্ভাৰ ২২। ৩ তাৰিখৰ পিটিনেৰ ও এই তাৰিখৰ এই মোকদ্দমা উঠাই
লগৰ দস্তাৱৰ অৱস্থা নকৰ ৭ উঠাই লইবাব দস্তাৱৰ উপৰ চেলী বাবুৰ এই তাৰিখৰ
দহুদা অৱস্থা নকৰ।

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